

ROYAL BOTANIC GARDENS, KEW.

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**XLI.—THE IMPERIAL BOTANIC GARDEN OF PETER
THE GREAT AT ST. PETERSBURG.**

(With Plates.)

O. STAFF.

On June 24th, the bicentenary of the Imperial Botanic Garden of St. Petersburg was celebrated under the auspices of the Russian Government. The festivities, which were of a very solemn character, took place in one of the buildings in the Garden and were attended by the Princes Peter and Alexander of Oldenburg, Prince Gagarin as representative of Princess Eugenia of Oldenburg, the patroness of the Garden, the Ministers of Agriculture and Crown Domains, Commerce, Justice, Public Instruction and Marine, and other prominent officials and a large number of delegates from the Russian Academies, Universities, Botanic Gardens and similar institutions and from foreign countries. The Royal Botanic Gardens, Kew, and the Physic Garden, Chelsea, were represented by the writer of this article.

The meeting was preceded by a Te Deum, after which the Minister of Agriculture and Crown Domains opened the proceedings with a short address and the reading of a rescript from the Emperor by which the name of the Garden was changed into that of Imperial Botanic Garden of Peter the Great. Then followed an oration by the Director, Professor Fischer von Waldheim, dealing with the history and the functions, past and present, of the Garden, and the reading of the addresses, first of the foreign delegates and then of the representatives of the Russian learned societies and corporations and other bodies connected with botany. The address embodying the greetings and congratulations of Kew runs as follows:—

“On the Occasion of the Two Hundredth Anniversary of the foundation of the Imperial Botanic Garden, St. Petersburg, the Royal Botanic Gardens, Kew, beg to join with other Botanical Establishments throughout the world in the expression of warm congratulations and good wishes.

“The cordial relations which in the past have subsisted between the sister institutions have benefited both gardens and furthered the cause of that science to which the two are devoted. That these relations may be as distinctive of the future, that the services

of the Imperial Garden to science may be as marked, and that its welfare and renown may be as great as in the past is the cordial wish of the Royal Botanic Gardens at Kew."

HISTORY OF THE GARDEN.

The Botanic Garden of St. Petersburg was founded by Peter the Great about 1713. The date usually given is the 11th February (old style) 1714, but Lipsky has been able to prove from documentary evidence that it was in existence at least as long ago as the 11th December (old style) 1713. There are therefore only ten years between the foundation of St. Petersburg itself and that of its Botanic Garden. If the laying out of the capital on the marshy banks and islands of the Neva was a bold and hazardous enterprise which only the genius and the iron will of the great ruler could carry out, the foundation of a garden on such ground was in its own way a no less bold experiment. The site selected for the garden was on one of the northern islands in the angle formed by the Greater Nevka and a small branch of the latter, the Karpowka. It was very low and consequently much exposed to floods. The primary object of the garden was the cultivation of medicinal plants for the army and navy. Hence its designation as Apothecaries' Garden and of the island on which it was situated as Apothecaries' Island, a name which is still in use. Subsequently the garden also served teaching purposes, and as its scope was widened, room was made for a more scientific treatment.

We possess a description of the garden by Peter von Haven, a Dane, who went to St. Petersburg in 1736. Speaking of Apothecaries' Island, which at that time was covered with a pretty spruce-wood through which avenues had been cut, the writer says, "The finest thing in the island is, however, the garden from which the island has its name . . . One finds there many kinds of plants and trees as occur in Europe and Asia, particularly in the greenhouse—so many, in fact, that Professor Siegesbeck, who is Director of the garden, assured me repeatedly that of all the gardens he had seen in other countries or from which he had catalogues, none was equal to it. At my time several hundred new species were introduced from China and Tartary, so that the Doctor was busy enough with giving them new names. The garden provides all the apothecaries with herbs, whence it is called Apothecaries' Garden. An apothecary resides always in the garden and it is his business to gather the herbs and prepare them. There are also plenty of fruit trees, as is evident from the fact that the rent of the fruit trees yields several hundred Reichs-Thaler per annum. However, it must be admitted that most of the fruit is neither so large nor so good as with us."

Of the men who directed the garden or were otherwise connected with it, it may be sufficient to mention J. C. Buxbaum, the traveller, J. G. Siegesbeck, known through his opposition to Linnæus, and J. P. Falk, the explorer of Russia and a pupil of Linnæus. The number of species cultivated in the Apothecaries' Garden does not seem to have at any time been very large. F. E. L. Fischer estimates it at 1300* at its highest. In the beginning of the last

* A "Catalogus plantarum horti Imperialis medici Petropolitani in Insula Apothecaria," published in 1796, contains 1456 species.

century its importance declined very much, and was quite overshadowed by the fame of Count Alexis Rasumowsky's garden at Gorenki, near Moscow. This garden owed its existence entirely to the enlightened taste and the generous liberality of its owner, and its dissolution after his death in 1822 appeared inevitable. In those circumstances the Emperor Alexander decided on the complete reorganisation of the old garden on Apothecaries' Island, and F. E. L. Fischer, who since 1804 had directed the garden at Gorenki with so much success, was entrusted with the work.

This was begun early in 1823, and proceeded with such rapidity that three years later the last of the glasshouses was completed. Their total length ran to about 1600 m.* and they cost over £19,000. At the same time a sum of £3178 was granted for the purchase of plants and the annual budget of the Garden was fixed at about £2200. In 1824 F. E. L. Fischer himself went abroad to visit the more important Gardens of Germany, France and England, returning with 3230† species of living plants. In England Fischer visited the Royal Gardens at Kew, the garden of the Horticultural Society, Chiswick, and the Botanic Gardens of Chelsea, Edinburgh, Glasgow, and Liverpool. In London alone the purchases amounted to about £1600, whilst the plants presented were estimated to have equalled if not exceeded that sum in value. Falderman, a gardener with the Royal Horticultural Society, was engaged as head gardener for St. Petersburg, and he and Goldie, another English gardener who had travelled in America, were entrusted with the task of taking the collection of treasures safely to St. Petersburg. By 1830 the number of species in cultivation had risen to over 12,000. At the same time the great library of the Gorenki garden and that of Dr. Stephan were taken over and an annual grant of £180 made for the maintenance of the library. Thus the foundation was laid for a botanical library which as to completeness has for a long time been unequalled and even now has but few rivals in the world. In a similar way provision was made for the establishment of a herbarium, the nucleus of which was formed by what was then left of Professor Stephan's Russian collections, by Riedel's Brazilian herbarium, and other sets. Fischer's own herbarium (containing about 60,000 species) remained his private property until his death, when it was purchased for the Botanic Gardens from his widow. F. E. L. Fischer's task was greatly facilitated by the wide connections he had formed whilst still at Gorenki. He counted among his personal friends Sir William Hooker, with whom he corresponded up to the end of his life.

The Apothecaries' Garden at the time of its reorganisation had its name altered to that of Imperial Botanic Garden, while it was at the same time transferred from the Medico-chirurgical Collegium to the Ministry of the Interior and, in 1830, to the Ministry of the

* Fischer (in *Flora*, 1831, p. 99) says "750 Sarschinen oder 4130 englische Fuss." As a "sarschine" or "sasheen" is equal to 7 ft. (English), there must be some mistake in this statement. The conversion into metres was made from the dimensions as given in "sasheens."

† This is the figure given by Fischer himself in *Verhandl. Verein. Beförd. Gartenb.* in d. K. Preuss. Staat. 1844, p. 3 (reprint); see also English translation in *Bot. Mag.* vol. lxxi, at end, p. 26.

Imperial Household, where it remained until 1863. In 1830 the annual budget was £4250 and the size of the Garden not quite 22 hectares (about 54 acres).

Fischer retired in 1850 and was succeeded by C. A. Meyer, who since 1832 had been Assistant Director at the Imperial Botanic Garden. He died in 1855, when Eduard Regel, Chief Gardener in the establishment, was appointed Director. With him a new period in the history of the garden began. As already stated, the garden remained under the Ministry of the Imperial Household until 1863, and till then Regel acted as Director. When, however, it was decided to transfer the establishment to the Ministry of Crown lands, Trautvetter was entrusted with the administration of the Garden, and in 1866 took the title of Director of the Garden, Regel continuing to superintend the Herbarium and the cultures, and later on the cultures alone, as "Chief Botanist." In 1875 Trautvetter retired and Regel became again Director of the Garden, which was henceforth under his control until his death in 1892. It was during Trautvetter's interregnum, in 1869, that C. Maximowicz was appointed Chief Botanist, or Botanicus primarius in charge of the Herbarium, which post he held until his untimely death in 1890. These two men, however different in tastes, temperament and genius, have left their mark on the work and the position of the Petersburg Garden as it was up to nearly the end of the last century. It is not here the place to apportion their respective shares; but both Regel, the practical man, and Maximowicz, the scholar, found their opportunities mainly in the marvellous progress made in their day in the exploration of Central and Eastern Asia. In consideration of the geographical position of the Russian Empire and owing to the natural course of events, they wisely concentrated their efforts more and more upon that vast area extending from the Caspian to the Yellow Sea. In the Herbarium this made itself felt in the necessity of building up special collections, such as a Herbarium Rossicum, and a Herbarium Sibiricum, etc., by the side of the Herbarium Universale. In the garden an increasing number of Central and East Asiatic species were brought into cultivation, most of which found their way into European gardens, thanks to the liberality of Eduard Regel. The publications, moreover, which emanated directly and indirectly from the establishment have been devoted almost entirely to the floras of Russia and Central and Eastern Asia. Nowhere is this more evident than in the *Acta Horti Petropolitani*, founded by Trautvetter in 1870 and continued by Regel and his successors.

A 'Seminarium,' or depot for seeds, gathered in the Garden or received from travellers and explorers or by exchange, purchase or gift had been, it seems, a feature of the establishment from the earliest times. It continued to be a special department along with that of the 'Chancery' or Director's office, the 'Park' or Grounds, the Greenhouses, the Herbarium and the Library. To these departments in course of time were added a Museum containing carpological specimens, samples of woods, fossil plants and economically interesting objects, a biological laboratory, in 1868, and a seed control station, in 1870. To give

an idea of the size to which the collections had grown towards the end of Regel's directorship, it may be stated that the number of species and varieties in cultivation in 1892 is given as 27,030, that the annual accession to the Herbarium from 1872 to 1892 had on the average been 20,000, specimens, whilst the library had grown by the end of 1892 to 24,000 volumes. The budget for the Garden was fixed at £6330 in 1870 and, apart from extraordinary grants which became necessary from time to time, remained so under Regel.

Eduard Regel was succeeded by A. F. Batalin, who died four years later, and was himself succeeded in 1897 by Dr. Alexander Fischer von Waldheim, then Professor of Botany in the University of Warsaw.

The collections had long ago outgrown the accommodation provided for them, and the housing of the invaluable Herbarium and Library especially was dangerously inadequate. The existing laboratories were cramped for want of space; moreover, new branches of the science of botany claimed admission into the organisation represented by the Imperial Botanic Garden, with the greater force, in that as their practical value was immediately and therefore doubly obvious. The time had come for new buildings and the general reorganisation of the establishment. The erection of a new palm house and a *Victoria regia* house had already been decided on in 1896. They were completed in 1899 at a cost of over £19,000. Then in 1900 the annual grant of the Botanic Garden was raised to £12,768. A phytopathological station was established in 1901 and gradually enlarged. On August 21, 1911, the foundation was laid for a new building for the Herbarium and the Library. It is now finished at a cost of £31,780 and is ready to receive the collections. A similar amount has been sanctioned for the erection of a new building for the Museum, and it is contemplated that the work will be begun next year. The other departments of the Garden have each claimed and received a similar attention, and those, who like the writer, have had an opportunity of comparing the state of the establishment as it presents itself to-day with what it was 20 years ago will not fail to appreciate the great progress which has been made during that period in almost every direction.

ORGANISATION OF THE GARDEN.

The wide range of the work with which the Imperial Botanic Garden of Peter the Great is charged is thus defined in the official French guide issued on the occasion of the bicentenary:—The garden is intended principally for the study of the plants which compose the flora of Russia and the adjoining Asiatic countries; for the study of vegetable products; for research in plant anatomy and physiology; for the study of plant parasites and the means of combating them; for seed control; for the study of the properties and the cultivation of plants which may be of practical importance for agriculture, horticulture, industries or medicine; and, finally, for the popularisation of the botanical sciences.

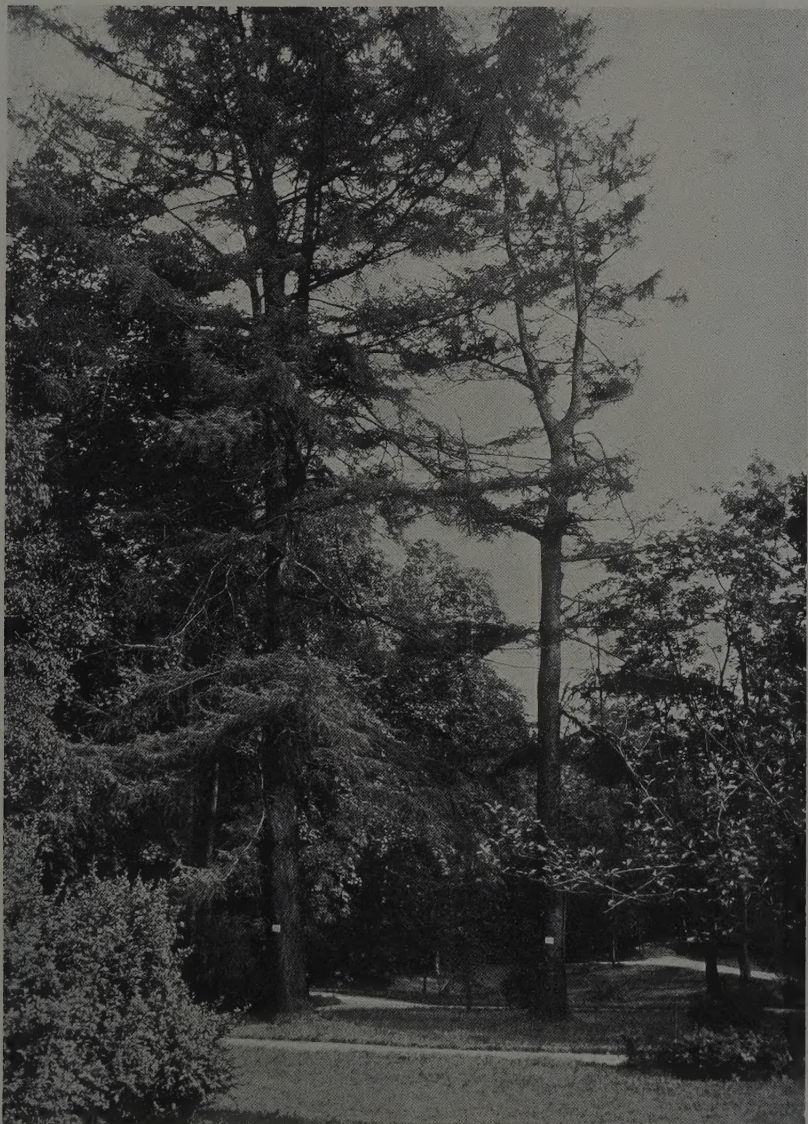
This work is divided among the following departments: (1) the park or the grounds, (2) the glasshouses, (3) the herbarium,

(4) the museum, (5) the library, (6) the biological station, (7) the seed control station, (8) the phytopathological station, (9) the seminarium, (10) the chancery or director's office, (11) a school for gardening.

The Director is assisted by a scientific staff, consisting of three chief botanists, one chief conservator, five conservators, two assistant conservators and a librarian; by the staff of the 'chancery,' which includes one secretary and accountant, one cashier, one "intendant," one clerk and two assistant clerks; and, finally, by two head gardeners and two garden assistants. There are further employed 35 skilled gardeners, about 50 "fixed" labourers of both sexes, and about as many artisans, guards, porters and inferior hands. The Garden has also its own electric station, superintended by an electrical engineer. The impending completion of the reorganisation of the Garden will naturally necessitate a considerable increase of the staff and of the annual grant, which it is expected will reach a total of between £17,000 and £18,000.

The glasshouses are open to the public throughout the year, the grounds at all seasons with the exception of the winter, and the herbarium, museum and library on days and at hours fixed by the administration.

The Park.—The situation of the Garden has already been described. Its total area is about 22 hectares (54 acres), 12 hectares (not quite 30 acres) of which form the Park. This 'Park' is mainly laid out as an arboretum, with a parterre in the centre for the reception in summer-time of flowering plants from the glasshouses, and a belt of rockwork, rather over elevated, principally for the display of plants from Asiatic Russia and the adjoining countries, the plants being grouped geographically. There are also beds with representatives of the principal natural families of certain biological types and of economically interesting plants, on the whole pleasantly worked into the landscape. Very prettily laid out are some groups along a sluggish watercourse, more or less overshadowed by trees, and given up partly to a collection of plants characteristic of the flora of St. Petersburg and partly to systematic groups, including a large number of hygrophilous or aquatic and subaquatic plants. One can see that they feel at home and harmonise in their ecological requirements with the wood, towards the edge of which they are placed. If Peter von Haven's statement that Apothecaries' Island in his day was mostly covered with a spruce wood is correct, as it very likely may be, it is clear that very little of the original vegetation has been left in the Garden. Of conifers only the native species (spruce, common pine and larch), *Larix sibirica* and *L. dahurica* (see plate), and *Thuya occidentalis* seem to thrive well. The prevalent trees of the Arboretum are deciduous, as for instance limes (mostly *Tilia cordata*, or as they are labelled *T. ulmifolia*), poplars, birches, elms, willows, maples (*Acer platanoides*), bird-cherries, mountain ashes, &c. The ground underneath the trees is covered with a fairly luxuriant herbaceous vegetation, which in the small clearings forms typical northern meadows. Avenues are cut through the wood, and shrubs have been planted alongside and in other open places, some of which are doing exceedingly well, as for



LARIX SIBIRICA AND L. DAHURICA.



OSMUNDA REGALIS.

instance *Rubus nuthkaensis*, *Cornus alba*, *Lonicera tatarica*, several species of *Crataegus* (particularly *C. sanguinea*) and *Cotoneaster*, *Spiraea sorbifolia*, *Caragana frutescens* &c.

No great variety or brilliant effect can be expected from a garden in the latitude of the Shetlands, where the snowdrop and the hazel do not begin to flower until towards the last week of April or even the beginning of May and frosts set in usually in the first week in October. Yet the aspect of the Garden and especially of the wooded portion with its rich young green is very pleasant indeed in the long days of the early summer and evidently much appreciated by the public which crowd there on Sundays.

The number of perennials grown in the grounds was given in 1912 at 4946 species and varieties, and those of the annuals at 1576.

The Glasshouses.—The disposition of the glasshouses is still according to F. E. L. Fischer's plan of 1824. They are arranged along the sides of a square about 200 m. by 150 m. A cross range parallel to the longer sides divides the square into nearly equal halves, whilst two smaller ranges project into the southern court. The large new Palm house and the pretty *Victoria regia* house jut out from the south side; the total length of the glasshouses amounts to over 1 km. and the space covered by them to 3 hectares (7.4 acres). The collection of plants contained in them is extremely rich, comprising over 19,000 species and varieties. The Palm house and the *Victoria regia* house as well as all the greater part of the other houses are iron structures with single glazing. The problem of keeping a thermophilous vegetation not only alive but flourishing in a climate with six months of winter and much reduced daylight is certainly one of very great difficulty; but a visit to the Fern, Aroid, Cycad or Palm houses shows that the difficulties have been overcome in a surprising way, mostly it seems, by keeping the temperature during the winter as low as the plants will stand it—for instance at 2.5-5° C. in the great Fern house, 5-7.5° C. in the *Rhododendron* house, which also contains Cacti and succulent *Euphorbias*—and thus reducing the vital processes to a minimum during the critical period.

Long ago attempts had been made to introduce landscape gardening into the larger houses. Cohn, more than 50 years ago, has spoken in enthusiastic terms of the effects thus obtained and they deserve, indeed, no less praise to-day. In the summer, when so many of the less delicate plants are transferred to the "parterre" in the "Park," it may be difficult to form an idea as to the state of the houses during the greater part of the year, but the hot houses did not appear overcrowded, and the largest of them produced a striking effect owing to the freedom allowed to the plants which seemed to be perfectly at ease and able to display all their charms. The Fern (No. 2), Cycad (No. 17) and the Palms (No. 26) house may be singled out as particularly deserving of admiration. Among the ferns some splendid specimens of *Osmunda regalis* with a base as colossal as that of an old *Todea* may be mentioned, if only because one of them has been promised to Kew (see plate). They were obtained from Sotshi (District of the Black Sea) in the Caucasus.

The Museum.—The museum is at present housed in a narrow building erected in the north court and along the central range of glasshouses. It comprises eleven rooms in which a small part of the very extensive collections is displayed in upright and table show cases. A considerable portion of one of the rooms is given up to the illustration of the desert flora of Turkestan which moreover, like that of Kamtschatka, is represented by a large number of excellent photographs, many being in the form of transparencies hung against the windows. The publication of a selection of these photographs would, no doubt, be welcomed by many botanists. Quite unique are a priceless collection of Ginseng roots, and a very effective exhibition of sand-dried flowers.

The erection of the new museum building will afford the much needed opportunity for the adequate display of the treasures which are at present still hidden away in cases and cabinets. The extent of the museum collections may be grasped from the figures given in the French guide book of the Garden, namely 8400 specimens for the dendrological, 29,400 for the carpological, 2800 for the paleontological and 7400 for the economic collection.

Biological Laboratory.—This adjoins the museum and is principally destined for the study of purely scientific or practical questions relating to plant life. Lately the work done there has been particularly concerned with problems connected with chlorophyll.

Herbarium.—This is, as already stated, one of the most important departments of the establishment. As it will fortunately be moved very soon into the new building, it is not worth while to dwell on the conditions of its present home.

The new building stands in the south-west corner of the gardens, about 200 m. from the glasshouses and the centre of the Park. It is a large building of four stories with an unpretentious elevation. The ground plan occupies an area about 85 m. long and 22.5 m. deep in the centre and 16 m. in each of the two wings. The construction throughout is fireproof. The central block contains the main staircase, lavatories and a lift, then on the ground floor, the vestibule and an inquiry office, and on each of the other floors a large general working room (15.3 m. \times 6.8 m.). The wings are intended for the library (ground floor) and the herbarium (the other three floors). There are two office rooms for the scientific staff on each wing and on each floor. The eight large rooms in which the collections will be housed receive their light through five windows each on the west and four windows each on the east side. The floor space available for collections amounts to about 2400 m. (900 m. for books and 1800 m. for herbarium). The cabinets for the reception of the herbarium will be placed in double blocks between the windows and at right angles to them, and along the transverse walls. Room is marked out for 178 cabinets on the first and 292 on the third and fourth floors or 470 cabinets altogether. The cabinets are made of pinewood with birch wood veneering, each holding 60 shelves. The total number of shelves proposed is therefore 28,200. They are of two sizes, according to the two sizes of paper used for mounting. The collection is estimated to contain 90,000 species in 2,500,000 specimens. It is divided into 10 separate herbaria: (1) a general herbarium of Phanerogams and vascular Cryptogams; (2) a general

herbarium of lower Cryptogams ; (3) a Chino-Japanese herbarium ; (4) a Russian herbarium ; (5) a herbarium of Turkestan ; (6) a Siberian herbarium ; (7) a herbarium of the flora of St. Petersburg ; (8) a herbarium for teaching purposes ; (9) an Arctic herbarium ; (10) a collection of useful plants.

An ample supply of incandescent lamps provides for the illumination of the herbarium, while the heating is effected by hot water pipes. The scientific work undertaken at the herbarium will also in the future be mainly concerned with the floras of Russia and the adjacent countries. The collections are available for study by visitors on week days from 11 to 3 o'clock.

Library.—The library has until now been lodged in the same building as the herbarium, but before long it will be moved into the new herbarium building. It numbers at present 17,000 works in over 38,000 volumes. The books are kept in glass cases which are locked. There are three catalogues in use (1) a chronological catalogue in 6 volumes ; (2) an alphabetical card catalogue and (3) a subject catalogue (printed). For administrative purposes the library and the herbarium form separate departments under the control of the Director. Visitors have access to the library on weekdays from 10 to 3 o'clock, excepting Saturdays (in the summer).

Seed Control Station.—This is in the same building as the museum and it also has its own staff and special equipment. It possesses a mycological collection, a collection of diseased or otherwise injured plants, spraying appliances and other similar instruments for the destruction of parasitic organisms. The station is devoted primarily to research work, but also supplies gratis information concerning plant diseases and mycology generally.

Seminarium.—The functions of this department have already been explained on p. 246. It is at present lodged in the herbarium building.

School of Horticulture.—This is an elementary school attached to the Garden and under the control of the Director, but maintained by the Society for the Protection of Poor and Sick Children of St. Petersburg and is subsidised by the Government. It occupies a special building and has its own fruit and vegetable garden.

It only remains to add a few words concerning the official publications emanating from the Imperial Botanic Garden. The principal journal, "*Acta Horti Petropolitani*," has already been mentioned. It has run to more than 30 volumes, with about 18,000 pages. To this was added in 1901 the "*Bulletin du Jardin Impérial Botanique de St. Petersburg*," and in 1902 the "*Journal traitant les moyens de combattre les maladies et les lésions des plantes cultivées et des plantes sauvages utiles*," which in 1907 was superseded by another journal under the title "*Les maladies des plantes*," and finally in 1912 the "*Annales de la station d'essais de semences*." The annual seed lists (*Index*—now "*Delectus*"—*Seminum quas Hortus Botanicus Imperialis Petropolitanus pro mutua commutatione offert*), which were started by F. E. L. Fischer in 1835 and the earlier issues of which contain descriptions of many new species, have been continued so far without a break.

The bicentenary of the Imperial Botanic Garden of St. Petersburg has called forth the publication of a great memoir on the history (from 1713 to 1913) and the organisation of the Garden. So far, one volume, "Historical Sketch of the Imperial Botanic Garden of S. Petersburg (1713-1913)," by V. I. Lipsky, has been published, a quarto of 412 pages with 54 illustrations, mostly views from the Garden and in the houses. Not less than 297 pages are given up to the early history of the Garden (1713-1823), so much of which has hitherto been obscure.

Like most modern scientific works published in Russia, the memoir is written in Russian, as is the bulk of the more recent publications that have emanated from the great Garden at St. Petersburg, although some of them are accompanied by summaries in German or French. In so far as botany is concerned, a great change has come about during the last two decades in the use of Russian by Russian writers. Before then German, and to a smaller extent Latin and French, were the recognised vehicles for the communication of the results of botanical research work achieved by Russians in Russia. The history of the development of science in Russia is sufficient to explain that fact. To-day Russian science is rooted in the Russian people, and it has begun to speak almost exclusively in its own native tongue. Those who wish to see science internationalised—and in the end science is of all countries and not of any particular one—may sigh at the new burden which is laid on their shoulders by the upgrowth of a rapidly increasing literature written in a language which, beautiful as it may be, is really very difficult. Latin as a means of intercommunication is—apart from technical descriptions—practically dead and artificial languages are as remote as ever from practical application. There is indeed for the coming generation no way out of the dilemma save to recognise the process as a perfectly natural, legitimate and inevitable one and to add to its equipment a knowledge of a language which has already given much and promises to give still more. This was perhaps the lesson which impressed itself most on the writer during the days when the Botanic Garden on the Neva celebrated its bicentenary amid the acclamations of an assemblage as enthusiastic as it was representative of all that is connected with botany throughout the great Russian Empire.

XLII.—NOTES ON QUEENSLAND FLORIDEAE.

A. D. COTTON.

Mr. F. Manson Bailey's "Comprehensive Catalogue of Queensland Plants," which has just appeared, forms a valuable addition to the botany of Australia. The catalogue is not limited, as is so often the case, to flowering plants and vascular cryptogams, but it includes lengthy lists of algae, lichens and fungi. Mr. Bailey's interest in the flora of the country in which he has spent so many years is well-known, and it is largely owing to his enthusiasm and energy that the more obscure groups of plants have been so

vigorously collected. In the census given by him, 3606 species out of a total of 7865 belong to the Cryptogamia, which is a large proportion for a new country.

With regard to the fungi and marine algae, though the foundations of the flora were worked out many years ago by Berkeley, Cooke, Sonder and others, further supplies of material collected by Mr. Bailey and his collaborators have been continuously forwarded to Kew during the last few years. These have been determined as fully and rapidly as circumstances permitted, and the names, many of which were listed at the time in the "Queensland Agricultural Journal," are now incorporated in the new catalogue.

Amongst the algae forwarded several were set aside to await better material, or as worthy of more detailed notice. The following observations are the outcome of the investigation of some of this material. No corrections are put forward, nor are any additions to the catalogue recorded, the notes being for the most part of morphological or geographical interest.

Ceratodictyon spongiosum, Zanard.

Ceratodictyon is one of the most interesting of those marine algae which live in symbiosis with a sponge. The genus was hitherto unrecorded from Australia, but is apparently not infrequent in tropical Queensland since several specimens collected by E. J. Banfield at Dunk Island were forwarded.

The symbiosis of the larger algae and sponges is not uncommon in the tropics, and the same phenomenon is met with on a smaller scale in the sponges of cooler regions. In the British Isles carpets of short filamentous algae are often seen to be in competition with the encrusting sponges which grow in caves and other dark recesses on the shore. In some cases accidental concrescence of the two organisms is noticeable, in others such association is more or less constant and intimate. A further and much more advanced state of union is met with in the sponge *Halichondria panicea*, which is at times completely invaded by a green filamentous alga. The external form of the sponge remains unchanged, but infected plants may be recognised by their green colour. In the tropical seaweed *Thamnoclonium Tissotii*, on the other hand, the alga is the dominant partner, the sponge growing symbiotically on the surface of a large foliaceous thallus (see later).

Ceratodictyon differs from all the above in that a change in form is probably induced through the commensal existence. The main segments of the thallus are composed of very slender multicellular branches, which are woven together to form a dense network, the interstices being filled up by the sponge, which also forms an investing coat around each segment. In this case both organisms are with little doubt materially modified in habit. Excellent figures of *Ceratodictyon* have recently been published by Okamura (Icones of Japanese Algae, vol. ii, no. 1, Plates 51 and 52).

Corallopsis Urvillei, J. Ag.

The tetraspores in the genus *Corallopsis* are little known and have apparently not been described for the present species. A fine specimen (Bailey No. 199) is remarkable in possessing cystocarps and at the same time an abundant crop of tetrasporangia. The latter are produced in special very short pedicellate lateral branches, and are oblong ($60 \times 25\mu$) and cruciately divided.

C. Urvillei appears to be confined in Australia to tropical waters. It is known from Cape York and Trinity Bay, and all the specimens recently forwarded are from Dunk Island.

Digenia simplex, *Ag.*

A southern extension can be recorded for this species, a specimen from Dunk Island collected by E. J. Banfield being received. In the southern hemisphere the plant appears to be more limited in its range than in the northern, as in the latter it spreads well up into temperate waters, being frequent in the Mediterranean and also on the coasts of Japan.

Amansia pumila, *J. Ag.*

Evidently a rare species. Collected at Cape York many years ago by Daemel, and admirably figured and described by Sonder, the plant does not appear to have since been recorded. A good supply of material was forwarded from Dunk Island, and this for the most part, like the original gathering, was entirely sterile. A few pieces however bore cystocarps. These are of large size, and are produced on the marginal teeth of the pinnae.

Vidalia fimbriata, *J. Ag.*

V. fimbriata is one of the less-known Queensland algae, though it was described by Dawson Turner as long ago as 1811, being collected by Robert Brown (see Hist. Fuc. iii, Tab. 170). The type is preserved at the British Museum, and with it Mr. Bailey's plants have been compared. They agree well in size and habit, but the majority have very much broader fronds, and it is probable that R. Brown's specimen represented a narrow form. The plant is not unlike *V. spiralis* (Lam.) J. Ag. of West Australia, but differs from that species in producing its tetraspores in the marginal teeth and not from the midrib of the lamina, and also in the arrangement of the cortical cells.

No specimens of the plant existed previously at Kew, hence it may be regarded as a rare species of limited range, though perhaps locally frequent in N. Queensland.

Dunk Island. E. J. Banfield, Oct. 1909.

Neurymenia fraxinifolia, *J. Ag.*

The single gathering received supplied cystocarps which were hitherto unknown. They are borne on the adventitious shoots which spring from the surface of the fronds, and are produced, like the stichidia, on both sides of the thallus. Whether the procarps are situated on the primary adventitious branch, or on the secondary "fruiting branchlets" which Falkenberg describes for the tetrasporangia, could not be ascertained.

The plant is known from various localities in the Indian Ocean and was collected by Harvey in West Australia, and during the "Challenger" Expedition at Cape York, but has not hitherto been met with elsewhere in the Australian Continent.

Dunk Island, E. J. Banfield, Feb. 1910.

Thamnoclonium Tissotii, *Weber.*

This species, which in common with others of the genus, grows symbiotically with a sponge, was described by Madame Weber van Bosse in 1910, having been collected at the Kei Islands during the "Siboga" Expedition. It was interesting to receive the same

plant from Queensland, in the tropical parts of which State it would appear to be frequent, since six gatherings were forwarded from Dunk Island. Madame Weber kindly confirmed the determination.

The general morphology and structure of the present plant is very different from that of *Ceratodictyon* described above. The thallus consists of large, flattened, foliaceous segments of parenchymatous structure. Both surfaces are completely clothed with a thin sponge, into which penetrate curious moniliform filaments given off from the outer layer of algal frond. The external appearance of the dual organism is that of old faded fronds, with varying outline, but on handling, the surface is found to be distinctly rough, and a section shows the sponge with numerous clusters of projecting spicules. The connection between the moniliform filaments and the sponge is doubtless close, but on the whole the commensalism is hardly so intimate as in *Ceratodictyon*. For further details see Weber, Ann. Jard. Bot. Buitenzorg sér. 2, Suppl. iii., pp. 587-594.

XLIH.—THE WALLICHIAN HERBARIUM.

When Dr. Nathaniel Wallich, Superintendent of the Hon. E. I. Company's Botanical Garden at Calcutta from 1817* to 1845, visited England on leave in 1828 he had entrusted to him the task of arranging for the distribution of the dried specimens of plants in the East India Company's Museum, collected under his own superintendence. In connection with this undertaking Wallich began to draw up a list of the species represented in the collection and distributed, or to be distributed, by him to various botanical institutions. The title of this list, which constitutes the well-known Wallichian Catalogue, cited as 'Wall. Cat.' or 'Wall. Cat. Lith.,' is as follows :—

"A numerical list of dried specimens of plants in the East India Company's Museum, collected under the superintendence of Dr. Wallich of the Company's Botanic Garden at Calcutta."

The purpose of the compilation cannot be better stated than it has been by Wallich himself on the opening page :—

"The principal object of the following list is to supercede the necessity of writing the numerous copies of labels, which will be required on the occasion of the distribution of the duplicates in the Company's collection. For this purpose each specimen will have a current number attached to it, besides separate ones in all cases when two or more different habitats are assigned to the plants ; so that, by comparing the number of the specimens with those in the list, they will be readily identified, their exact locality

* Dr. Wallich is usually stated to have held charge of the Calcutta Garden from 1815 onwards (Britten & Boulger Biogr. Ind., p. 176), and as a matter of fact he was placed in temporary charge of the Garden on 24th Feb., 1815. From this charge he was relieved on 20th April, 1816, and was not placed in permanent charge until the receipt in India of an order from the Court of Directors to this effect on 1st August, 1817. (Ann. Roy. Bot. Garden, Calcutta, vol. x., p. xxiii, footnote.)

"ascertained, and the discrimination of the different species comprized occasionally under one name facilitated. The species will, as much as possible, be enumerated under their respective genera; but frequent exceptions to this rule must necessarily occur. Those which have been sent home in preceding years will be distinguished by having the abbreviated word 'Herb.' affixed to them, together with the year in which they were received and deposited in the Company's museum.—London, 1st December, 1828."

In the following year, as the subjoined explanation, which is given on folio 60 of the catalogue after No. 2153, shows, permission was accorded to distribute various other collections in addition to those collected by Dr. Wallich himself.

"Since the preceding sheets were printed the undermentioned herbaria have been added from the East India Company's Museum to the collection brought home by Dr. Wallich, principally with a view to the distribution of their duplicates. They will be indicated in the manner noticed below.

"1. An herbarium collected chiefly in the Circars by the late Dr. Patrick Russel. Contains no duplicates.—Herb. Russel.

"2. An extensive herbarium from the peninsula of India, collected apparently by the late Drs. Klein and Heyne and by Dr. Röttler. Contains many duplicates.—Herb. Madras.

"3. A very extensive herbarium collected in various parts of Hindustan by the late Dr. F. Hamilton (formerly Buchanan). Contains not many duplicates.—Herb. Hamilt.

"4. A small herbarium of the late Dr. Roxburgh. Contains no duplicates.—Herb. Roxb.

"5. An herbarium collected by the late Mr. George Finlayson, surgeon and naturalist to the mission which was sent to Siam and Cochinchina by the Bengal Government in 1821. Contains some duplicates.—Herb. Finl.

"6. A most extensive herbarium collected in various parts of the peninsula of India by Mr. Assistant Surgeon Richard Wight, lately in charge of the botanical establishment at Madras. Contains a great number of duplicates.—Herb. Wight.

"7. Several collections forwarded by Dr. Wallich to the Company's Museum and containing a vast number of duplicates. They will be referred to in the manner heretofore adopted and pointed out in the first page of this list.

"December, 1829."

The preparation of the catalogue and the distribution of the herbarium proceeded rapidly; and had reached No. 2,603 in 1830, No. 4,877 in 1831, and No. 7,683 in 1832. It had not, however, been possible to complete the task when it was necessary for Dr. Wallich to return to India and resume charge of the Calcutta Garden. But, before he left, it had been arranged that the type set of the catalogued specimens and the unassorted residue be

transferred to the Linnean Society, and a letter from the Court of Directors of the Honourable East India Company addressed to Lord Stanley, then President of the Society, offering the Wallichian Collections as a free gift to the Society, was read at a meeting of the Society's Council on 23rd June, 1832. This offer the Council accepted, resolving thereupon to hold the herbarium as a trust for the general benefit of science, and drafting in reply to the letter an address which was taken by the President and as many members of Council as could attend, to the East India House, Leadenhall Street, on 26th June, 1832.

This letter and the address in reply were, by permission accorded to Dr. Wallich* on 7th August, 1832, printed in the postscript to the third and last volume of Wallich's *Plantae Asiaticae Rariores*, and are as follows :—

East India House, 19th June, 1832.

MY LORD,

THE Court of Directors of the East India Company have within the last four years caused to be distributed to various bodies in this country and in Europe, interested in the promotion of science, between 7,000 and 8,000 species of plants collected by celebrated naturalists in the Company's service, during a series of years, in India.

The objects being attained for which the originals of these specimens have been placed with Dr. Wallich in Frith Street, the Court of Directors feel that this Collection may not be an unacceptable addition to the Museum of the Linnean Society of London, which already possesses the herbarium of the celebrated Linneus. We have therefore the honour, at the instance of the Court of Directors, and in the name of the East India Company, to proffer, through Your Lordship, for the acceptance of the Linnean Society, the Collection in question ; and should the Council of the Society be pleased to give effect to the intentions of the Court, the necessary directions will be given to Dr. Wallich to transfer the Collection to the party who may be authorized by the Council to receive the same.

We have the honour to be,

My Lord,

Your Lordship's most obedient humble Servants,

(Signed) JOHN G. RAVENSHAW.

C. MARJORIBANKS.

To the Viscount Stanley, M.P.

The Council of the Linnean Society having had a letter laid before them by the President, addressed to his Lordship by the Chairman and Deputy Chairman of the Court of Directors of the East India Company, in which that Honourable Court have been

* Wallich had previously been appointed member of a Committee of four, which included Robert Brown, Francis Booth, George Bentham, and himself, whose duty it was to superintend the arrangement of the herbarium and the provision of cabinets. The Court of Directors of the East India Company had further voted a sum of £200 for the purchase of paper upon which to mount the specimens.

pleased to offer for the acceptance of the Society the extensive Collection of dried plants preserved in the Museum of the India House, take the earliest opportunity of expressing their high sense of the distinguished honour conferred upon the Society by this unexampled act of liberality.

The Council, in behalf of the Society, accept with feelings of profound gratitude the Collection thus proffered to them, and beg to assure the Court that it shall be held as a trust for the general benefit of science.

The Council cannot avoid expressing their admiration of the enlightened policy shown by the Honourable Court of Directors, with relation to their collections in natural history, in extending the advantage to be derived from them, by the most liberal distribution of specimens throughout the scientific world, and by this memorable instance of their munificence, in placing the fruits of the labours of König, Roxburgh, Rottler, Russell, Klein, Hamilton, Heyne, Wight, Finlayson and Wallich, along with those of the immortal Linneus.

The East India Company, by extending its patronage to those distinguished naturalists who have cultivated science in Asia, so much to their own honour and to the credit of the service to which they belonged, and by the general use of the rich materials in its possession, has deeply impressed the members of every learned institution throughout Europe and America with feelings of admiration and respect; and the Council of the Linnean Society can only re-echo the voice of general acknowledgment for the great services which the Honourable Company has thus rendered to the cause of science.

An example of disinterestedness has been exhibited by the Company which has already reflected, and will continue to reflect, deserved honour upon them and upon the country, and which cannot fail to diffuse a spirit of emulation throughout the world.

London, June 23rd, 1832.

In October 1832 Dr. Wallich addressed letters to the Linnean Society, which were read in Council on 6th November, reporting that the remainder of his collections had been sent to the Society on 29th September and requesting the Council to transmit the best set obtainable to the garden at Calcutta.*

* How far an effort was made by the Linnean Society to carry out Dr. Wallich's wishes is unknown; we know that no specimens were sent by them to the Calcutta Garden. It is, however, interesting to find that this request was made and that Wallich, before his return to India in 1832, had already realised the consequences of the distribution "to various bodies in this country and in Europe" of the "plants collected by celebrated naturalists in the Company's service, during a series of years, in India" without arranging that "the best set obtainable" should be placed in the "Garden at Calcutta" at whose expense and on whose behalf the bulk of these collections had been brought together. It may be that when Wallich, in 1828, obtained the approval of the Court for the list of the institutions to which he proposed that sets of specimens should be given he did not contemplate the necessity of returning to India and that to this circumstance may be due the omission of the Calcutta Garden from the list of recipients of its own specimens. We know that when, in 1847, Wallich returned to Europe and had himself an opportunity of doing what was still possible to repair the injustice which had been committed he did not take that opportunity. It was left to Hooker and Thomson to do what Wallich had left undone (*K.B.*, 1912, p. 5).

In addition to £200 voted by the Court of Directors to pay for the paper on which the specimens were mounted, the sum of £80 was spent by the Linnean Society in glueing down the sheets and before the anniversary meeting of the Society on 23rd May 1833 £310 14s. had been spent on cabinets and other outgoings. Under this heading £5 more was spent subsequently.

At folio 254 of the Catalogue occurs the following note by Dr. Wallich:—

“I have been enabled to add the following two indexes through the generous and valuable assistance I have received from my highly esteemed friend Mr. Royle, late Superintendent of the Botanic Garden at Saharunpore, to whom I take this opportunity of returning my warmest thanks. This indefatigable and admirable botanist has lately arrived in this country from India with a magnificent harvest of dried plants, drawings and descriptions, a great proportion of which relate to the fruitful and hitherto unexplored regions of Kunnower and Cashmere and will be published by him without delay.”

When Dr. Wallich retired from the service of the Hon. East India Company and returned to Europe he took up his abode in England and set about the completion of the list and of the distribution. The supplement which begins on folio 269 of the Catalogue opens as follows:—

“Numerical list of dried plants in the herbarium of the Honourable East India Company presented to the Linnean Society of London, continued from Dr. Wallich’s List.

“Euphorbiaceae and other plants which on the first sorting were mixed with them and have been roughly arranged in species for the purpose of distribution.”

This supplementary distribution was in active progress during 1847–49 and was completed by the end of the latter year. To a very great extent the accomplishment of this portion of his task was facilitated by the assistance which Wallich received from Bentham, acknowledged at folio 263 and again at folio 290 and 300, in the following terms:—

f. 283. “I have to state with grateful thanks to Mr. Bentham, that without his continued, most obliging and valuable assistance, at his residence here, I should have been unable to index and prepare the remnant of the East Indian Herbarium for its final distribution.—Pontrilas House, Hereford. 22nd Octob. 1847.—N. WALLICH.”

f. 290. “I have again to return my grateful thanks to my friend G. Bentham, Esq., for having enabled me to proceed with the East Indian Herbarium.—Pontrilas House, Hereford. 5th August, 1848.—N. WALLICH.”

f. 300. “Before leaving my friend Mr. Bentham and his noble herbarium, I have again and lastly to express my most grateful thanks to him for that distinguished assistance by which alone I have been enabled to bring this catalogue to a conclusion.—Pontrilas House, near Hereford. 10th September, 1849.—N. WALLICH.”

Dr. Otto Kuntze, who has made a careful study of the Catalogue issued by Wallich, as apart from the specimens with which the Catalogue deals, has given an account of the work in his *Revisio*

Generum Plantarum, vo 1., p. cxlv., which is so exhaustive that an English version may not be unsuitable here. It runs as follows:—

Wallich, N. A numerical list. According to Pritzgel the date is 1821. This, however, is only the date of the title-page. The new genera established in it have been cited by Pfeiffer with inconsistent and often, with regard to the numbers, contradictory dates. I have drawn up a long list which, however, does not give me any trustworthy results. In Wallich's list, or catalogue, as it is usually cited, the following dates may be found:—Preface, December 1, 1828; after no. 2159, December 1829; after no. 4361, 1830; after no. 7683, 1832; later, in the supplement, nos. 7684–9148, after no. 8234 [8324], October 22, 1847, after no. 8622, August 5, 1848 and on folio 300, November [September] 10, 1849. Nos. 7684 to 9148 were therefore published in the years 1847–9. I was not clear as to the earlier numbers till I found in an unpublished dictionary by de Candolle the following valuable note:—Nos. 1–2153, 1829; nos. 2154–2603, 1830; nos. 2604–4877, 1831; nos. 6225–7683, 1832. Nos. 4878–6224 appear not to have been received by de Candolle; they could, however, have appeared only between 1831 and 1832. In Wallich's Catalogue there are occasional later corrections and repetitions of earlier numbers which, with regard to the question of priority, scarcely need be considered. Judging from the occasional notes and acknowledgments by Wallich, he had the assistance or collaboration of R. Brown, Bentham, Lindley, Royle and Wight,* who in other works helped to introduce the many new names, though *nomina seminuda*, contained in the Catalogue, otherwise rejected by Bentham. This was also more frequently done at the expense of Don's *Florae Nepalensis Prodrum*, 1825, the author of which, dealing with the same flora, not rarely anticipated Wallich. The remainder of these *nomina seminuda*, so far as they have priority, must stand.

Before leaving the subject of this Catalogue it should be noted that in the Herbarium at Kew there is a manuscript commentary dealing with the localities cited by Wallich for certain of his numbers. This commentary, which is from the pen of the late Mr. C. B. Clarke, is of considerable value, and it may serve a useful purpose if it be reproduced here for the benefit of those other institutions that possess sets of the Wallichian specimens.

Notes on the "Khasia" localities of Wallich's List.

The frontier of Sylhet was, at the date of F. De Silva's collections, just north of Pundua where it is now. Pundua was then as now the "Gate" of the Hills, the main-road ascending 4000 feet from Theria north of it. At this date there were English officers and troops at Nungklao, who went up from the north valley (Goalpara); but none at Cherra Poonjee.

'Khasia' was subsequently part of Zilla Sylhet, and (down to 1868) under the Judge of Sylhet, and was called North Sylhet. The locality 'North Sylhet' occurs frequently in the collections of Griffith, &c., but not (so far as I recollect) in Wallich's; it was a name later than Wallich's time.

* Dr. Kuntze might have added particularly the name of Graham, Professor of Botany, Edinburgh, who assisted Wallich in dealing with the Leguminosae.

At Sylhet Station, 16 miles S.E. of Pundua, there are teelas, isolated hills 100 feet high, and considerable tracts of jungle between and round them. This is very fine collecting ground; here grow many orchids and figs, and *Asplenium longissimum*, which Wallich marks "Sillet." Under n. 2278 Wallich writes "Sillet De S.," "? B. Mont. Sillet, F. De Silva." From this it is clear, as from many other entries, that Wallich distinguished between 'Sillet,' i.e., the old (and present) Zilla, and the 'Mont. Sillet' or 'Mont. Sillet vicinae,' by which he indicated Khasia.

There are, however, a large number of plants marked by Wallich 'Sillet' only, which in all probability came from Khasia. This is especially the case in the first numbers 0-2160; afterwards Wallich was more careful. In the case of common, or widespread, plants Wallich seems (even later) not to have troubled to write more than 'Sillet.'

Pundua is the farthest point north to which F. De Silva's boat would go. He collected, from his boat, along the rich Terai (0-2000 feet alt.) along the southern face of the hills; and he appears to have ticketed such collections simply 'Pundua.' Many of the plants thus ticketed 'Pundua' were (from our present knowledge of their distribution) collected at 2-6000 alt. and some way into the hills. F. De Silva may have made 2 or 3 days excursions from his boat, or may have employed Khasis to collect.

The only point to note here is that all the collections marked 'Pundua' came (certainly to me) from Khasia—no collector at Pundua would attempt collecting southward thence in the swamps—all the 'Pundua' plants came from the hills.

None of the plants marked 'Sillet' can be safely or profitably assigned to Khasia on Wallich's authority. Many we may strongly suspect to be Khasi, on abundant other evidence; it is in all these cases useless to cite Wallich (i.e., for the locality Khasia) because his examples ticketed 'Sillet' adds nothing to our evidence, i.e., as to Khasi localities; it only proves that the plant was collected either in Sylhet or in Khasia.

Any 'Khasi' localities taken from Wallich's List should include all the plants marked 'Pundua,' 'Montes Sillet' and none of those marked 'Sillet.'

On some of Wallich's sheets, the name Sillet has by some hand been ruled out and Singapore foisted in; as in the case of *Asplenium longissimum* and some other species belonging to the teelas at Sylhet Station.

C. B. CLARKE.

25 August, 1896.

The Wallichian Herbarium itself was transferred in 1857 from Soho Square to Burlington House. In 1863 the Wallichian Collection was specifically exempted from the regulations under which the miscellaneous collections of the Linnean Society were disposed of and in 1873 the Herbarium was moved into the apartments at present occupied by the Society.

When in 1872 the preparation of the *Flora of British India* was undertaken by Sir J. D. Hooker the Society's Council, on 1st February, gave permission that such specimens in the Wallichian

Herbarium as might be required during the progress of the *Flora* for comparison with those in the Herbarium at Kew, be allowed to be borrowed from time to time as required.

About 1881 the desirability of re-arranging the Wallichian Herbarium in numerical order came up for discussion and on 16 June, 1881 a committee was appointed to carry out the suggested re-arrangement. During the autumn recess the task was accomplished by the late C. B. Clarke, and the Committee of which he was the most active member submitted a report on the collection in which certain gaps in the sequence were pointed out. In 1886 a circular was sent to the chief European herbaria, requesting that the missing numbers specified might be returned. Some of these missing numbers have, as a result, been replaced.

In 1904 urgent demands upon the space at the disposal of the Society in its apartments led to the removal of the Cabinets from the Council chamber upstairs to the old Post office, where they were set up afresh. The opportunity was taken to repolish the Cabinets; the cost of this and of their removal amounted to £49 16s.

More recently the same demand for space has led the Society to desire that the Wallichian collection might find another home. The difficulty that has stood in the way of the realisation of this desire has been in connection with the considerable expenditure incurred by the Society from first to last in connection with the Cabinets in which the specimens are preserved.

Thanks to the munificent generosity of one of its Fellows* the Society has been placed in the position of being able to carry out what for a considerable time has been known to be the general wish, and the General Secretary of the Society was instructed to write as follows to the Director of Kew :—

Burlington House, Piccadilly, W.

April 4, 1913.

At a Special General Meeting of this Society held yesterday, 3rd current, the following motion was adopted by the Fellows :—

That the Wallichian Herbarium and later additions from Dr. Horsfield and others be offered to the Royal Botanic Gardens, Kew.

The Council further stipulate that all expenses connected with the removal and transference of the said collections are to be borne by the beneficiary.

* In connection with this generous act the General Secretary of the Linnean Society has at the request of the Director of Kew supplied the following explanation which deserves permanent record here :—"Burlington House, "25th July, 1913. With reference to the Wallichian Herbarium transferred to "your keeping by consent of the Society in General Meeting assembled, on the "3rd April, 1913, that resolution only concerned the collection of dried plants "with additions from Horsfield and others.

"The mahogany faced cabinets were transferred to Kew in consequence of "the generous gift by Sir Frank Crisp, Bart., of the sum at which they were "valued by the Council, and this gift enabled the Council to submit their "resolutions to the Society as stated."

I am therefore to ask whether you will accept these collections on the terms stated and in any case an answer which can be laid before the Council on the 17th instant will be esteemed.

The reply to this letter was as follows :—

Royal Botanic Gardens, Kew.

April 5, 1913.

I HAVE the honour to acknowledge receipt of your letter dated 4 April conveying the text of a motion relative to the Wallichian Herbarium now the property of the Linnean Society which the Council of the Society had been so kind as to formulate and the Fellows in Special General Meeting assembled have been so generous as to adopt.

In reply I beg to inform you that I shall be glad to accept the collections referred to in the motion under the conditions which the Council have attached to the donation.

The transfer of the Herbarium to Kew in accordance with the arrangement detailed above took place on July 11th, 1913.

XLIV.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII
CONSERVATARUM.

DECAS LXXIV.

731. *Rosa* (Cinnamomeae) *persetosa*, *Rolfé* [Rosaceae]; affinis *R. aciculari*, Lindl., sed floribus minoribus in paniculas laxas dispositis differt.

Frutex erectus, ramosus. *Caules* paniculisque longe et dense setosi. *Folia* 8–11 cm. longa; rhachis gracilis, puberula, sparse glandulosa et aculeis paucis gracilibus instructa. *Foliola* 5–9, elliptica vel elliptico-ovata, serrulato-dentata, 1·5–4 cm. longa, 1·2–5 cm. lata, supra glabra, subtus puberula. *Stipulae* adnatae, lineari-oblongae, acutae, minute pectinatae, 1–1·7 cm. longae. *Paniculae* terminales, 9–12 cm. longae, copiose setosae. *Bractaeae* lanceolatae, acuminatae, 1–2 cm. longae. *Pedicelli* graciles, glabri. *Cupula* oblonga, 5–6 mm. longa, glabra. *Sepala* 2–2·5 cm. longa, basi ovato-oblonga, medio angusta, apice lanceolata, minutissime puberula et ciliata. *Corolla* 2·5 cm. lata, saturate rosea; petala 1·3–1·5 cm. lata. *Stamina* 3–4 cm. longa; antherae 2 mm. longae. *Styli* 2·5 mm. exserti.—*R. macrophylla*? *forma gracilis*, Vilmorin, Fruct. Vilmorin (1904) 94.

CHINA.

Flowered with Messrs. Paul & Son, The Old Nurseries, Cheshunt, in June, 1912. In its strongly setose character the species recalls *R. acicularis*, Lindl., but it differs from this and every other member of the *Cinnamomeae* in its lax, many-flowered panicles, which give the plant a very graceful appearance. The flowers are also rather small, and the sepals relatively long, being

about twice as long as the petals. Messrs. Paul received this rose from Messrs. Vilmorin, Paris, and from a dried specimen afterwards received from the latter firm it appears that they obtained it from China some years ago with the seed number 711, and that it flowered with them in June, 1903. It has recently been received from Mr. M. Nicholls, Sevenoaks, with the number, Wilson, 4418, showing that it has since been collected by Mr. E. H. Wilson during his recent mission to China.

732. *Deutzia compacta*, Craib [Saxifragaceae-Hydrangeae]; species a *D. rubente*, Rehder, inflorescentia compacta multiflora, floribus minoribus distinguenda.

Ramuli primo pilis stellatis scabridi, mox glabri, cortice brunneo vel rubro-brunneo obtecti. *Folia* lanceolata vel oblongo-lanceolata, apice acute acuminata, basi rotundata vel cuneato-rotundata, 1·7–5 cm. longa, 0·8–1·9 cm. lata, pagina utraque pilis stellatis albis parce instructa, nervis lateralibus utrinque 5–7 intra marginem anastomosantibus supra impressis subtus prominentibus, nervis transversis paucis supra impressis subtus prominulis, petiolo 3–4 mm. longo supra canaliculato suffulta, margine argute serrulata. *Inflorescentiae* corymbiformes, multiflorae, ramulos laterales ad 10 cm. longos basi bracteatos terminantes; pedunculi communes ad 1·5 cm. longi, partiales circiter 5 mm. longi; pedicelli ad 3 mm. longi; alabastra obovoidica, alba, superne leviter puniceo-suffusa, bracteis bracteolisque minutis. *Receptaculum* viride, late campanulatum, 1·5 mm. altum, fere 2 mm. diametro, ut sepala pilis parvis stellatis tectum. *Sepala* vix 1·5 mm. longa, obtusa vel breviter obtuse acuminata, ciliolata. *Petala* imbricata, subrotundata, 4 mm. diametro, alba vel dorso superne leviter puniceo-suffusa. *Stamina* petalis valde breviora; exteriorum filamenta denticulata, dentibus antheras haud attingentibus, interiorum filamenta iis exteriorum valde breviora, dentibus antheras superantibus. *Styli* glabri, stamina interiora subaequantes.

CHINA.

Cultivated at Kew and at Glasnevin; plants originally received from Messrs. Vilmorin.

733. *Lonicera Robertsonii*, Gamble [Caprifoliaceae-Lonicereae]; species *L. obscurae*, Coll. et Hemsl., et *L. Bournei*, Hemsl., affinis, foliis ovato-cordatis infra pubescentibus, floribus brevioribus corollae tubo pubescente differt.

Frutex scandens (?), pubescens; ramuli graciles, fulvo-velutini. *Folia* ovata, apice obtusa vel obtuse acuta, basi cordata, in ramulis ultimis 3–6 cm. longa, 2–4 cm. lata (forsan in vetustioribus majora), chartacea, supra praeter costam glabra, nitida, infra fulvo-pubescentia et minute glandulosa, costa gracili supra pubescente, nervis lateralibus utrinque 4–5 curvatis, reticulatione conspicua, integra; petiolus gracilis, vix 3–4 mm. longus, pubescens. *Flores* geminati, in fasciculis axillaribus subsessilibus vel breviter pedunculatis; bracteae subulatae, 2 mm. longae, hirsutae; bracteolae ovatae, vix 1 mm. longae. *Receptaculum* ovoideum, 2 mm. longum, glabrum. *Sepala* triangularia, acuta, 1–2 mm. longa, pubescentia. *Corollae* tubus gracilis, cylindricus, 3–4 cm. longus, extra pubescens; lobi 5, quorum 4 ovati, fere acuti, quintus oblongus, longior. *Antherae* oblongae, obtusae, haud exsertae. *Stylus* filiformis,

inferne glaber, superne hispidus, paullo exsertus; stigma capitatum, subbilobum. *Fructus* adhuc ignotus.

INDO-CHINA. Upper Burma: Southern Shan States, near Ohgyi, Bawlake, in dry rocky country with pine forest, 1200 m., *W. A. Robertson* 142.

734. *Bragantia affinis*, *Planch. Mss. ex Rolfe* [Aristolochiaceae]; a *B. tomentosa*, Blume, foliis angustioribus basi cuneatis vel subrotundatis et triplinervis facile distinguenda.

Ramuli angulati, cinereo-tomentosi. *Folia* petiolata, oblonga vel anguste elliptico-oblonga, obtusa, basi cuneata vel subrotundata, triplinervia, supra glabra, subtus crebre reticulato-venosa, arachnoideo-pubescentia, pilis adpressis, 15–20 cm. longa, 4·5–7 cm. lata; petioli 0·6–1·5 cm. longi, pubescentes. *Pedunculi* ex infra caulis parte producti, simplices vel paucè ramosi, 6–10 cm. longi, cymosi, cinereo-pubescentes. *Bracteae* oblongae vel elliptico-oblongae, subobtusae, pubescentes. *Flores* pedicellati. *Pedicelli* 0·8–1·5 cm. longi. *Perianthium* basi ovario adnatum, lineare, stipitiforme, supra ovarium articulatum, late campanulatum, trifidum, extus pubescens; lobi rotundato-ovati, subobtusii, subaequales, 5 mm. longi, fauce aperta, annulata. *Stamina* 6; antherae oblongae, 1·5 mm. longae; filamenta brevissima. *Stylus* 2·5 mm. longus, trifidus. *Capsulae* lineares vel subfusiformes, acuminatae, moniliformes, circiter 5 cm. longae. *Semina* oblonga vel obovoideo-oblonga, subcompressa, tuberculata, 4 mm. longa.

PHILIPPINE ISLANDS. Island of Panay, *Cuming* 1689. Dumarao, Panay, *E. D. Merrill* 6700. Luzon, prov. of Tayabas, at Tagcauayan, *Ramos* (Bur. Sc. 13,370).

This species, first collected by Cuming, was named by Planchon, but apparently never published. It has been again collected in the island of Panay by Mr. Elmer D. Merrill, and also in Luzon by Ramos, the specimens from the latter locality having rather broader leaves.

735. *Actinodaphne Henryi*, *Gamble* [Lauraceae-Litseae]; species florum umbellulis in racemos sericeos circa 2–2·5 cm. longos collectis et foliis magnis conspicue nervosis insignis.

Arbor 9 m. alta; ramuli crassi, griseo-puberuli; gemmae elongatae, perulis obtusis sericeis, inferioribus margine glabris. *Folia* coriacea, 4–5 in verticillis ad apices ramulorum, lanceolata, apice acuminata, basi attenuata, 30–40 cm. longa, 7–13 cm. lata, supra glabra, subtus glauca, secus costam et nervos molliter pubescentia, costa crassa subtus conspicua, nervis utrinque 10–12 conspicuis obliquis prope marginem gradatim arcuatis, imis fere marginalibus, nervulis minimis parallelis junctis; petiolus crassus, 4–5 cm. longus. *Flores* ♂ ignoti; ♀ florum umbellulae in racemos axillares 2–2·5 cm. longos eximie albo-sericeos basi bracteis obovatis sericeis circa 1 cm. longis suffultos collectae; pedunculi circa 3 mm. longi; bracteae involucrales cito caducae; flores in umbellulis circa 5; pedicelli sericei, 2–3 mm. longi. *Perianthii* tubus campanulatus, extra et intus sericeus, 2 mm. longus; lobi intus glabri, obtusi, trinervii. *Staminodia* 9, ordinis I et II clavata, 1·5 mm. longa, ordinis III minora, glandulis 2 orbicularibus munita. *Ovarium* ovoideum, glabrum, stylo gracili geniculato, stigmate magno capitato papilloso. *Fructus* ignotus.

CHINA. Yunnan: Szemao, 1200 m., *A. Henry* 11,799A.

736. *Lilium* (Martagon) *Thayerae*, *Wilson* [Liliaceae-Tulipeae]; species ex affinitate *L. sutchuenensis*, Franch., a qua caule rigido dense brevissimeque hispidulo in axillis foliorum conspicue albo-barbato, foliis lineari-oblongis marginibus revolutis scabridis, floribus in racemum laxum pyramidalem dispositis, alabastris villosis differt.

Bulbus late ovoideus, 2·5–6 cm. diametro; squamae ovatae vel lanceolato-ovatae, acutae, albae, saepe roseo-tinctae. *Caulis* erectus, 0·5–1·5 m. altus, rigidus, dense brevissime albo-hispidulus, usque ad 15–20 cm. sub flore infimo folia numerosissima densa erecto-patentia gerens, in axillis foliorum pilis albis floccosis barbatus. *Folia* anguste lineari-oblonga, apice acuminata, decurva, 8–12 cm. longa, 3–4 mm. lata, pagina utraque puberula, punctisque lucentibus obsita, prominenter uninervia, supra canaliculata, costa subtus scabrida prominenter carinata, margine recurvo minute denticulato scabridoque. *Racemi* pyramidales, laxi, 1–20 (vel ultra)-flori; pedicelli rigidi, robusti, 8–15 cm. longi, erecto-patentes vel horizontales; bracteolae solitariae (rarius duae), folio similes, patulae; alabastra cernua, praesertim statu juvenili dense villosa. *Perianthium* mediocre, saturate coccineum; segmenta reflexa, oblonga vel oblongo-lanceolata, apice obtusa, 7–8 cm. longa, 1·5–2 cm. lata, praesertim a medio basin versus atro-maculata, maculis rarius sparsis vel omnino deficientibus, apice villosa, interiora inferne papillis carnosus hic illic instructa, dorso valde carinata; sulci nectariferi segmentorum interiorum apices attingentes, latere utroque carina inferne usque ad trientem albo-villosa ceterum glabra adjuncta. *Stamina* pistillo breviora; filamenta subulata, inferne complanata, circiter 5 cm. longa, triente superiore extrorsum curvato, aurantiaco-tincta, glabra; antherae oblongae, 2–2·5 cm. longae, primo coccineae, maturescentes fusciscentes. *Ovarium* viride, demum aurantiaco-brunneum, cylindricum, sulcatum, circiter 2 cm. altum; stylus aurantiaco-tinctus, extrorsum curvatus, infra stigma subcomplanatum aurantiaco-brunneum tenuiter incrassatus. *Capsula* purpurea, subglobosa vel obovoidea, trigona, angulis laevibus, truncata, erecta, circiter 2·5 cm. alta, 2 cm. diametro.—*L. sutchuenense*, Franchet in Journ. de Bot., vol. vi., p. 318, quoad specimen a Prin. Henri d'Orleans lectum; Gard. Chron., ser. 3, vol. xxxviii., p. 91, cum tab.; Wilson in Flora and Silva, vol. iii., p. 330, t. fig. 2 and icon.; Grove, Lilies, p. 72, pro parte.

CHINA. Western Szechuan: Tachienlu, *E. H. Wilson*.

This new species is named after Mrs. Bayard Thayer, Lancaster, Mass., a keen lover of horticulture and a generous friend of the Arnold Arboretum's exploration work in China.

737. *Lilium* (Martagon) *Willmottiae*, *Wilson* [Liliaceae-Tulipeae]; species a *L. Thayerae*, Wilson, caule debili pubescente, foliis lineari-lanceolatis trinerviis marginibus planis laevibus, floribus dense racemose dispositis, alabastris nutantibus glabris, sulco nectarifero segmentorum perianthii interiorum ad tertiam partem producto differt.

Bulbus late ovoideus, 2–7 cm. diametro, albus; squamae pro rata numerosae, ovato-lanceolatae, acutae. *Caulis* debilis, basi radicans, 0·75–2 m. altus, teres, gracilis, plus minusve dense rubro-purpureo-maculatus, puberulus. *Folia* congesta, etiam ea quae floribus proxima normalia, sed densiora brevioraque, patentia, lineari-lanceolata, acuta,

basi haud angustata, 5-16 cm. (plerumque 8-12 cm.) longa, 4-7 mm. lata, parte superiore decurva, supra viridia, nitida, canaliculata, costa pallide viridi prominula, subtus pallide viridia, costa prominente nervis lateralibus duobus subconspicuis, pagina utraque punctis lucidis conspersa, margine hyalino, basi in latere utroque pilis paucis floccosis instructa. *Racemi* densi, 3-25 (vel ultra)-flori; rhachis nitida, cum pedicellis fusco-purpureo-maculata; pedicelli uni- vel interdum bi-flori, horizontales, decurvi, 5-12 cm. longi, teretes; bractea brevis, foliosa; bracteolae 1 vel saepius 2, parvae, foliosae, patulae; alabastra intense aurantiaca, apice truncata. *Flores* aurantiaci, plerumque maculis parum elongatis fere nigris dense tecti, rarius sparse maculati, 5-6 cm. diametro. *Perianthii* tubus circiter 1.2 cm. longus; segmenta valde recurva, conspicue biseriata, exteriora anguste oblonga, apice obtusa, basi in unguem 1 cm. longum contracta, 5.3 cm. longa, 1.4 cm. lata, usque ad 1.5 cm. infra apicem maculata; sulci nectariferi viridescentes, 1.6 cm. longi, marginibus elevatis inflexis albo-papillosa-pilosis (praesertim in parte inferiore) apicem versus minute viridescente-pubescentibus; segmenta interiora oblongo-lanceolata, 5.3 cm. longa, ubi latissima 1.8 cm. lata, apice abrupte rotundata vel truncata, 8-9 mm. lata, basi angustata, 5-6 mm. lata, usque ad 1-1.5 cm. infra apicem maculata; sulci nectariferi iis segmentorum exteriorum structura similes, sparsissime pubescentes, papillis carnosis hic illic instructi, dorso prominenter carinati. *Filamenta* pallide aurantiaca, subulata, inferne complanata, apice recurva, circiter 4 cm. longa, glabra; antherae oblongae, 1 cm. longae, fusco-brunneae, pollinis granulis intense aurantiacis. *Pistillum* ad longitudinem maturam solum post antherarum dehiscentiam perveniens, 4.5-5 cm. altum, glabrum; ovarium 1 cm. altum, sulcatum, nitido-viride; stylus pallide aurantiacus, superne incrassatus, in dimidio superiore triqueter, extrorsum curvatus; stigma parvum, trigonum, rotundatum, pallide aurantiacum. *Capsula* straminea, erecta, obovoidea, trialata, apice truncata, depressa, 2.5 cm. alta, 2 cm. diametro.—*L. warleyense*? Gard. Chron., ser. 3, vol. lii., p. 15 (nomen nudum); Journ. Roy Hort. Soc., vol. xxxviii., part 2, p. cxlvi. fig. 118.

CENTRAL CHINA. North-western Hupeh, July and October, 1907, *E. H. Wilson* 693.

738. *Muehlenbergia Arundinella*, *Ridl.* [Gramineae-Agrostideae]; quoad magnitudinem affinis *M. sylvaticae* Torr., spiculis longioribus et aristis brevioribus differt.

Herba 6-12 dm. alta, culmis solidis. *Folia* linearia, acuminata, 25 cm. longa, 6 mm. lata, pubescentia; ligula ciliata; vagina pubescens, 14 cm. longa. *Panicula* elongata, stricta, 30 cm. longa, ramis copiosis gracilibus spinulosis. *Spiculae* purpurascende-virides, adpressae, subremotae, brevissime pedicellatae, ciliis ad bases albis. *Glumae* I et II lanceolatae, acuminatae, angustae, 4 mm. longae, purpurascens vel virides, dorso et marginibus spinulosae; gluma III (fertilis) straminea, glabra, 3 mm. longa; arista 1-2 cm. longa, ad basin spinulosa, gradatim in apicem album capilliformem attenuata. *Antherae* quadratae, oblongae, brunneae. *Stigmata* plumosa, atropurpurea. *Rhachilla* ultra glumam producta, brevis, lata, oblonga. *Lodiculi* obcuneati, truncati. *Caryopsis* cylindrica, angustissima, versus apicem paullo attenuata, 2 mm. longa.

PAPUA. Dutch New Guinea: Utakwa expedition, Mount Carstensz, 640-3200 m., *C. B. Kloss*; Vanape Valley, *Guilianetti*.

This grass appears to be very common on these mountains. The specimens from the highest camping ground at 3200 m. were, as might be expected, somewhat dwarfed.

739. *Deschampsia Klossii*, *Ridl.* [Gramineae-Aveneae]; affinis *D. caespitosae*, Beauv., sed ligula bifida, panícula grandis, et gluma III trifida arista brevior differt.

Herba caespitosa. *Folia* angusta, 15-18 cm. longa, rigida, subpungentia, vaginis 4 cm. longis; marginibus scarioso-papyraceis; ligula tenuis, scariosa, bifida, apicibus lanceolatis acutis. *Culmus* 60 cm. altus. *Panicula* laxa, magna, ramis gracilibus scabridis 20 cm. longis. *Spiculae* pallidae, biflorae, 5 mm. longae. *Glumae* I et II vacuae, lanceolatae, acuminatae, pallidae, translucens, carina viridi. *Rhachilla* ad basin utriusque floris albo-ciliata. *Gluma* III lanceolata, trifida, pallida, apicibus tribus acutis; arista e dorso glumae infra lobos, dimidiam partem glumae aequans. *Palea* exaristata, lanceolata, bifida, lobis longis acuminatis. *Stamina* 2, antheris brunneis.

PAPUA. Dutch New Guinea: Utakwa expedition, Mount Carstensz, Camps xiii-xiv, 3200-3800 m., *C. B. Kloss*.

740. *Arthrostylidium angustiflorum*, *Stapp* [Gramineae-Bambuseae]; affinis *A. Trinii*, Rupr., sed spiculis longioribus multo laxioribus, valvis tenuioribus longius aristulatis, foliorum laminis laete viridibus infra ad basin et in uno latere tenuiter pubescentibus, vaginis ore fimbriis persistentibus munitis distinctum.

Frutex, culmis fistulosis gracilibus laevibus; ramuli permulti, verticillati, plerumque simplices, erecto-patuli, 15-20 cm. longi, gracillimi, teretes, partibus e vaginis exsertis minute puberulis, florentes plerumque 7-nodi, sub anthesi apicem versus 3-4 laminas gerentes. *Cataphylla* turionum ignota. *Foliorum* vaginae arctae, pubescentes, ore albo-fimbriatae, fimbriis 2-2.5 mm. longis persistentibus; ligulae truncatae, ciliolatae; laminae lineares, superne longe tenuiter attenuatae, basi breviter in petiolum brevem puberulum contractae, 5-8 cm. longae, 4.5-5 mm. latae, laete virides, supra glabrae, inferne basin versus et in altero latere fere tota longitudine adpresse minute pubescentes, marginibus scabris, nervis omnibus tenuibus arcte approximatis subaequalibus 30-35 quorum 6 vel 7 exsiccano paulo prominentibus, venulis transversis nullis. *Racemi* terminales, secundi, distichi, leviter curvati, 1.2-2 cm. (quoad rhachin) longi; rhachis pubescens, internodiis inferioribus 3 mm., superioribus 4-5 mm. longis. *Spiculae* pedicello brevissimo puberulo rhachi arcte adpresso suffultae, anguste lineari-lanceolatae, 15-20 mm. longae, laxae, purpurascens, floribus perfectis 3 rarius 4, rhachillae virides glabrae internodiis tenuibus ad 3.5 mm. longis apice in cupulam minutam ciliolatam dilatatis. *Glumae* duae, dissitae, inferior setaceo-subulata, 1-nervis, 4 mm. longa, superior subulato-lanceolata, tenuissime 5-nervis, 5 mm. longa, aristulatae, glabrae nisi superne ciliolatae, aristula scabra. *Anthoecia* 5-6, infimum ad valvam vacuum redactum, summum hebetatum vel interdum fere ad setam redactum. *Valvae* a latere visae oblique lanceolatae, in aristulam scabram 2-4 mm. longam productae, aristula dempta 6-8 mm. longae, tenues, purpurascens, 7-nerves, secundum nervos viridi-punctatae vel striolatae, glabrae nisi

superne ciliolatae. *Paleae* lineari-oblongae, 6-8 mm. longae, albae, in apice ipso ciliatae et in carinis superne ciliato-asperae. *Lodiculae* 3, tenuissimae, hyalinae, ovatae, apice fimbriatae, intermedia minor. *Antherae* albae, 5 mm. longae. *Ovarium* oblongum, subito in stylum brevem constrictum, stigmatibus 2 fere a basi plumosis ad 3 mm. longis.

TROPICAL AMERICA.

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XLV.—VISIT TO THE FORESTS OF SWITZERLAND.

W. DALLIMORE.

By permission of the Director I was enabled to take part in a tour organised by the Royal Scottish Arboricultural Society in conjunction with the Swiss forestry officials, to the forests of Switzerland, during the latter part of July, and the following notes indicate the more interesting items observed.

The areas selected for inspection were chosen by the Swiss forestry officials with a view to directing attention to as many distinct features as possible in the time at our disposal. The principal districts visited were in the neighbourhood of Interlaken, Brienz, Zurich, Chur, St. Moritz and Thusis. Three Federal Inspectors of Forests, Dr. Fankhauser, Mr. Schonenberger and Mr. Merz, were deputed to take charge of the party over different areas, and in each district one or more of the chief foresters attended to explain the working methods. In addition Mr. Pulfer, the First Commissioner of Woods and Forests, accompanied the party during the early part of the tour and Dr. Arnold, one of Switzerland's most eminent forestry officials, took charge during the visit to Winterthur. The party was joined on the last three days by Dr. J. Coaz, the Inspector-General of Forests for Switzerland who, despite the fact that he is in his ninety-second year, is able to undertake a tramp of several hours with little inconvenience.

The ownership of the forests appears to be somewhat involved, for some are owned by the Federal Government, others by individual states or cantons, others by towns or local communities and others again are in the hands of private owners. All, however, are subject to periodical inspection by Government Inspectors, in order to ensure correct methods of management, for in many places not only is a rigorous continuity of the forest system essential to provide the necessary amount of timber required for fuel and manufacturing purposes, but the existence and prosperity of numerous towns and villages, together with the lives of the inhabitants, depend almost entirely upon the steep mountain sides being clothed with trees. Wherever bare mountain sides occur there is constant danger from landslides and avalanches, but where they are well clothed such catastrophes are rare.

On the lower land the activities of the forest officers are concerned mainly with the cutting and marketing of timber, the regeneration of cut areas and road making, but in the more mountainous regions a considerable portion of their attention is directed towards the fixing of land on steep slopes, the provision of barriers to check or

break the force of avalanches, the draining of subterranean water from land liable to slide and the control of mountain streams.

In the more favourably situated areas a considerable yearly income is derived from the forests, and in the case of town or communal forests such income is used for the relief of the rates of all free-men or burghers. Such people are also in receipt of a certain amount of firewood each year. Where a considerable amount of protection work is necessary, however, the expenses are in excess of the income and the deficiency is met by levying a small tax upon those who are likely to derive benefit from the work. Where the expense is great the cost is divided between the State, the canton in which the work is being carried out, and the adjacent towns and villages. In some instances mountain railways owned by private companies benefit, and in such cases the companies share the expense. Most of the country people living in the valleys are small holders and many of them assist with protection or forest work during part of the year. The burden of protective work appears to be taken as a matter of course by the folk concerned, for they know from experience that if the work were neglected they would be liable to lose everything they possessed in a few moments' time, whilst the fear of avalanches, landslides and floods would be ever present. For the same reason it is felt that the best people to undertake the work are those who stand to gain most from it, therefore by employing local labour the authorities contend that the work is performed more thoroughly than might be the case if strangers were imported.

The villagers possess certain rights in some forest areas, such as pasturing their cattle during summer in the mountain meadows which occur here and there amongst the trees. These meadows are termed communal grazings and each householder from the valleys is allowed to send his animals to graze for the summer in the proportion of one cow to four sheep or four goats. The grazing rights in the forest proper are sold, but cattle only are allowed amongst the trees, goats and sheep being excluded for the two-fold reason of their liability to injure trees and to climb precipitous slopes and loosen stones to the danger of the valleys. The requirements of the villagers regarding pasturage and fuel led some years ago to an extension of the meadows and the cutting of a considerable amount of timber on the higher ground, but steps are being taken to limit the range of meadows and to encourage a new growth of timber, whilst the people are being encouraged to surround their meadows with stone walls in preference to wooden railings with a view to saving the higher-grown timber and making use of loose stones which are a constant source of danger. Owing to the improvement in the breed of cattle which has taken place of late, fewer cows than formerly are required to produce a given quantity of milk and it is found more profitable to keep one cow than a number of goats. This has tended to relieve the grazing areas to some extent.

Whenever possible the forests are replenished by natural regeneration, planting being carried on only in places where it is not possible to obtain a natural growth, or when it is desired to introduce a new kind of tree into a particular area. The commonest soft woods are common spruce, silver fir, and Scots pine with

larch and *Pinus Cembra* in some regions, whilst the commonest hard wood is beech followed by oak and ash. A large amount of beech is required for fuel, and soft woods are used extensively for building purposes, pulp and wood-wool. Switzerland apparently suffers very little from wind in comparison to Scotland, for very few wind-blown trees were seen, although, in some cases, openings by felling had been made amongst trees which, had similar ones been made, would in Scotland have been fatal to the whole block. On the mountain sides clear cutting is forbidden by Act of Parliament whilst even on low ground other systems of felling are preferred.

The higher forestry officers receive their early training at Zurich. They attend a middle or secondary school until they are 17 years of age when they proceed to the University for $3\frac{1}{2}$ years. They are then given a minimum of $1\frac{1}{2}$ years of practical work and are ready at the age of 23 to take positions as assistant foresters.

Interlaken.—Monday, July 14th, was spent within a few miles of Interlaken. Train was taken to the Schynige Platte which is about 6,200 feet above sea-level and a few hundred feet above the tree limit. From there a five hours' walk was taken *viâ* Iseltenalp to the protection works at Schiltriesete, Sengg and Rischbachriesete. The greater part of the journey was along precipitous mountain sides which were generally fairly well clothed with spruce, with here and there communal meadows. In some places, however, there were considerable bare areas and loose ground and it was in such places that protection work was in progress. Some of the woods are 200 years old, but many areas have been planted during the last 50 years. About the middle of last century Interlaken suffered severely from floods and the mountain sides in various directions were planted with trees in order to prevent this. The scheme is said to have been quite successful, for floods are now unknown in the town. Twenty years ago Mannlichen was very subject to avalanches of stones, therefore a scheme of protective work was inaugurated and worked by the inhabitants of the neighbourhood. This has been in progress ever since and somewhere about 500,000 francs have been spent. In the more dangerous places strong retaining walls have been built; in other positions strong stakes and branches have been used to fix the ground. The strong surface about the higher points was planted with *Alnus viridis* and *Pinus Cembra*, and the lower parts with *Alnus incana* and spruce. About the time when work was commenced on Mannlichen great devastation was caused at Rischbachriesete by landslides and avalanches. To prevent a recurrence, Dr. Fankhausen instituted a system of protection works. He first controlled the subterranean water by drainage, then built a series of walls on the mountain side to form gigantic steps or terraces. Alders were then planted between the loose stones and what was originally bare rock is now being covered with trees, and the houses in the valley below are considered to be quite safe. Altogether about 700,000 francs have been expended upon the work. In another place where a landslide occurred many years ago and the surface had become clothed with trees some further movement was observed. This has been checked by building a strong retaining wall at the bottom of the weak part and by carrying out certain drainage works,

Brienzenz.—On July 15th the protection and afforestation works on the Upper Urseren, and the collecting ground for the Tracht-boch above Brienzen were inspected. The land in this locality rises rapidly by a series of steep terraces to a height of upwards of 7000 feet, whilst the valleys are narrow. The rocks suffer badly from erosion and until recent years avalanches of snow and stones were of regular occurrence, which made existence in the various hamlets very precarious. At the same time agriculturists about Brienzen suffered serious loss from time to time by the violent waters of the Tracht-boch bringing down large quantities of stones and other debris from the heights around and distributing them over a considerable area of cultivated ground.

Nearly a century ago an attempt was made to control the stream but the results were unsatisfactory, and it was not until 1870 that a further effort was made. About that date a wide and deep paved course about $1\frac{1}{2}$ mile long was built to connect the stream with the lake and prevent the washing of the land. This proved successful, so far as it went, but even then there was no definite control of the volume of water, and about 20 years ago the various hillsides draining into this stream, which had previously consisted of bare stony ground interspersed with communal and private grazings, were purchased by the town of Brienzen and placed in the hands of the forest officers. As much as possible of the higher land was covered with grass as a check to erosion and a dam was constructed to regulate the flow of water as it passed into the artificial course. So well has the water been regulated that it now passes to the lake in a regular stream, very little difference in the flow being noticeable in moderately dry and wet weather. The next work was to fix the steep slopes of the mountain sides. To effect this, numerous wide strong walls were built which serve as retaining walls, assist in checking snow slides, and form terraces on which to plant trees. Much of the surface consists of crumbling rock and the first vegetation established in such places was grass. This was cut in turves, carried in baskets for a considerable distance and planted in irregular lines. Seeds of various plants peculiar to the district were gradually deposited and a mixed vegetation appeared, then young trees were inserted which are now growing freely. The higher positions are above the natural tree line for the district and have been planted with *Pinus Cembra* and *Pinus montana*. Lower down spruce, silver fir, and Scots pine are employed, with *Alnus incana* to fix the soil. The trees on the higher ground are planted in clumps with open spaces between. This system is practised in order that the ground may be warmed better than if the trees were evenly distributed over the whole area. Although a considerable amount of work has been accomplished there is still much to do and men are engaged upon wall building throughout the summer months. In some parts strong stakes are used to break up avalanches, but walls are found to be generally more satisfactory. The more fertile parts of these mountain sides originally gave pasturage to 2000 goats, but neither goats nor cattle are now allowed upon the land.

One disadvantage has been observed in the checking of avalanches. The snow melts on the higher ground and the water sinks into and

saturates the loose soil and stones, draining out at a lower point. This tends to create landslides, therefore steps have had to be taken to drain such areas.

The town of Brienz at first employed 30 men on its protection and afforestation works but 10 only are employed at the present time. During winter they work on the lower grounds. In April planting is commenced on the lower slopes and the work is gradually carried upwards as the snow melts. Summer is spent on the higher ridges building walls, &c., and in early autumn the return journey is made. Accommodation is provided for living and sleeping high up on the mountains during summer. At that time the men work 11 hours a day and receive from 3*d.* to 5*d.* an hour according to length of service.

A considerable amount of wood carving is carried on in and about Brienz and the art is taught in the schools. Upwards of 1700 hands, including men, women and children, make this their occupation, whilst others work at it during the winter months and in the evening. Some of the more expert workers earn from 10 francs to 15 francs a day, whilst others may not make more than 3 francs or 4 francs.

Zurich.—Zurich was the next centre visited, a brief stay being made at Lucerne whilst on the way. In the vicinity of Zurich some of the best managed forest land in Europe is said to exist and the areas visited were certainly in remarkably good condition.

July 17th was spent in the Sihlwald, the town forest of Zurich. It has belonged to the town for upwards of 1000 years and is situated several miles south of the town in the valley of the Sihl. It covers about 2584 acres of steep hill sides, at altitudes varying from 1600 to 3200 feet above sea level and consists of a fertile clayey soil mixed with disintegrated sandstone, overlying soft sandstone. The climate is mild and damp, the annual rainfall being about 60 inches. Snowstorms are experienced as early as September and as late as May, and cause considerable damage to broad-leaved trees, more particularly to beech. No damage, however, is reported from wind. Late spring frosts sometimes do a good deal of injury and this year the ground was frozen to a depth of 6 inches for 4 days at the end of April. Throughout the country complaints are made of the severe frosts experienced in April this year, and in most parts the branches of walnut trees were cut back into wood from 4 to 6 years of age. Practically the whole of the fruit crop was also ruined at that time.

The timber in the Sihlwald during earlier years consisted almost entirely of beech, as the principal object of its upkeep was the supply of fuel for the town. With the improved means of import of coal, however, less wood was necessary and trees required for other purposes were encouraged. The forest now consists of about 60 per cent. beech; 10 per cent. ash and maple; 30 per cent. spruce, silver fir, larch and Scots pine; and 10 per cent. single trees such as elm, birch, cherry, mountain pine, yew, &c. Larch is only encouraged on dry sites and in open situations. In such places it gives excellent results, forming tall, clean trunks with little taper. It was first used in 1767. As affording an idea of its growth, a tree 67 years old was found to be 120 feet high with a girth of 5 feet at 5 feet above the ground,

For convenience of management the forest is divided into 20 compartments and is worked upon a 110 years rotation. Except that the rotation is a few years longer in the present day a somewhat similar system of management has been maintained since the 14th century. The longer rotation has become necessary owing to the gradual change in the kinds of trees grown.

Natural regeneration is relied upon whenever possible but spruce and larch are often planted. A regeneration period of 15 years is allowed, at the end of which time the seed trees are removed. At the end of 5 or 7 years a thinning is made, suppressed and badly formed trees being removed. Subsequently, until the final thinning is given at 70 years of age, thinnings are conducted every 5 or 7 years until the trees are 40 years old and every 10 or 14 years afterwards. Conifers, ash and maple are encouraged in preference to other trees. A strict account is kept of all thinnings, for from the earliest date they can be made into faggots, so that at the end of the rotation an exact account of the yield of each compartment is obtainable. During the first 30 years it is said that about 1000 cubic feet of timber per acre is removed. At 90 years of age one third of the whole volume is cut, the remaining trees being cut between that age and the end of the regeneration period. The final crop averages about 6,000 cubic feet to the acre.

There are 22 streams throughout the forest and in most instances it has been necessary to build proper falls and paved courses in order to check erosion. Owing to the steep nature of the land and the absence of hard stone, there are only a few roads and most of the timber is carried down the hills by slides, or tramways. In winter sledges are used and in summer wheeled trucks. Up to 5 tons of timber can be sent down at once on a sledge or truck. A considerable amount of firewood is cut into regulation lengths on the hills. Some of this is tied in bundles and sent down on sledges, but the greater proportion is sent down a transportable slide with a gradient of one in four. After a temporary slide has been laid and the wood collected and cut to the required length it is said that four men can send down as much as 7000 cubic feet in a working day of 9 hours.

The trucks and sledges used for the heavier wood are returned to the top of the hill by the aid of cattle and with regard to these a curious and interesting point was mentioned. The cattle used for this purpose are all hermaphrodites. These animals, to the extent of probably not more than one per cent., are born regularly in the Brunig district and are reserved as far as possible for forest work. From 750 to 800 francs is the price of such an animal, whilst a normal animal of either sex, or a bullock, can be procured for 600 francs.

All the timber grown on the Sihlwald is manufactured in a municipal sawmill situated in the valley and connected with both the forest and State railways. A large quantity of ash is made into tool handles, coniferous wood is cut into planks, &c., or impregnated with a 2 per cent. solution of copper sulphate and used for poles, whilst some of the spruce and silver fir is made into wood wool. The firewood is also distributed from this centre. It is all tied into bundles. The larger wood is cut into lengths of about

2½ feet, and split until about 3 inches in diameter. About 12 pieces are placed in each bundle and 100 bundles are sold for 80 francs. Smaller wood for fire lighting is cut about 7½ inches long and is made into round bundles each encircled by an iron band. The bundles are 20 inches in diameter and 100 are sold for 25 francs.

The officials consist of one forest-master, one assistant forest-master, four forest-guards, one sawmill-master, three clerks, and 120 labourers. The last named receive 5 francs 40 cents a day when they are first engaged and rise to 6 francs 40 cents a day. Altogether the net annual income from the forest area amounts to 80,000 francs.

Winterthur.—On July 18th the town forest of Winterthur was visited. This extends to about 3000 acres and is entered from the outskirts of the town. It has belonged to the town since the year 1264, at which date it was presented by Prince Rudolf of Hapsburg. The geological formation is similar to that of the Sihlwald, a fertile loam formed partly by the erosion of sandstone, overlying a bed of soft sandstone, but the gradients are easier and amenable to road-making. The forest officers have taken advantage of this and an excellent system of roads has been perfected by which all the timber can be extracted.

Climatic conditions differ from those of the Sihlwald, the annual rainfall being returned as 40 inches against 60 inches in the Sihlwald. A different system of management also prevails. Previous to 1898 clear felling by the strip system was practised, but owing to difficulties experienced in regeneration, that was discontinued, and felling and regeneration by groups adopted. By this means groups of trees of varying ages will eventually be found side by side instead of sections of different ages as in the Sihlwald. In this particular district the small group system of regeneration is said to be more economical than that previously in vogue, whilst the landscape effect is not disturbed.

The fertile ground favours the rapid growth of brambles and other coarse weeds where openings are made, and it is said to be easier to wage effective war against them by the small group system of felling and regeneration than when a considerable area has been clear felled. Another argument urged in favour of the system is that the quality of the soil is maintained in the highest degree by only uncovering small areas at once, therefore, by that means it is possible to obtain the best returns from the ground. Under this system of management the trees on an area 30 or 40 yards in diameter are felled, leaving a number of the best trees of desirable species as mother trees. A long regeneration period, extending to 30 or 40 years, is allowed for the mother trees being gradually removed. The minimum amount of injury to young trees is said to occur when every mother tree is felled with its head towards the road for it can then be pulled out small end first. During the regeneration period other groups will be cut and as young trees appear, old ones about the outskirts will be removed to give room and the different groups of young trees will gradually unite. The working plans are based upon the estimate that the whole forest will be cut over and regenerated in from 120 to 140 years.

Under the old system of management it is said that the net return per annum worked out at 71 francs per hectare per annum. This was raised in the early years of the group system to 121 francs per hectare per annum and the last three years has shown a return of 150 francs per hectare per annum. At the same time the standing timber is considerably heavier than ever before. The whole average return from the forest, including branches, thinnings and final fellings is placed at 8,700 cubic metres per annum. In this forest it is possible to dispose of the branches of trees at a profit. They are used for covering and protecting plants in winter.

Taking the forest throughout, the different kinds of trees are stated to be represented by 40 per cent. spruce, 30 per cent. silver fir, 10 per cent. other conifers, and 20 per cent. hardwoods. The trees grow to a considerable height, 120 to 140 feet being about the normal when fully grown, although some are said to attain a height of 150 feet. They are peculiar by reason of their great length of clear trunk and small taper. A silver fir log lying on the ground was measured. The base was 2 feet 6 inches in diameter and the point where it was cut off at 92 feet from the base measured $11\frac{3}{4}$ inches in diameter. At the point of the forest where the heaviest stand of timber occurs it is said to total 14,000 cubic feet to the acre.

In some parts patches of heavy land occur; on these alders are planted as a preparatory crop for silver fir which succeeds better than spruce in such positions. The boundaries of the forest are not stationary for new areas are constantly being added and it is estimated that at least 2000 acres have been used for agricultural purposes at one time or another.

The timber is not manufactured by the forest authorities but is drawn to the forest roads and sold by public auction.

It will thus be seen that in two forest areas so close together as those belonging to the towns of Zurich and Winterthur a considerable difference of management occurs, yet both are returning a good annual income.

Chur.—The town or communal forests of Chur were visited on July 21st. These cover an area of 5000 acres of steep mountain sides varying in elevation from 2000 to 6000 feet. The principal trees are spruce and silver fir, with a fair percentage of beech below 4,000 feet, and here and there Scots pine and larch. Beech is encouraged on account of the fertilising properties of its leaves, and is almost a pure crop in dark valleys. Larch is also encouraged as the wood is more valuable than that of any other conifer. It, however, can only be grown successfully on the south sides of the mountains and thrives better in groups than when planted as isolated trees. It succeeds to the limit of tree growth. The forests are divided into narrow felling belts or sections of 100 to 200 yards in width and the trees are removed by selection of single trees or by group felling. As far as possible natural regeneration is encouraged; beech and larch are, however, artificially introduced. Much of the timber grows to a considerable height and silver firs lying on the ground were found to be 130 feet in length.

Formerly the timber was brought down from the higher parts by slides in natural depressions in the ground but the system injured

both ground and timber to such an extent that it has been discarded and an elaborate system of forest roads is now being made by which all timber can be brought down by sledges in winter. Silver fir grown in this region forms very good timber and it is said that logs 20 to 30 feet long were sent to Zurich and used for piles for the foundation of the town hall.

Larch is quite free from fungus diseases but suffers to some extent from the larch-miner moth (*Colephora laricella*, Hbn.), whilst a species of mistletoe is very prevalent upon silver fir.

The forests of Chur give employment to 50 labourers regularly and to 120 during the summer months, and they are paid from 4 francs to 5½ francs a day of 10 hours. After the planting season is over many of these men are employed in roadmaking. The idea appears to be general throughout the country that a good system of well-made roads is essential to the success of forestry and wherever roads can be made slides are being abandoned in their favour, although the initial expense of roads is very heavy. Within the last few years 50 miles of forest roads have been made by this one commune. These are said to have cost about 20 francs per lineal metre. Of the expense the town has borne 70 per cent., the canton 10 per cent., and the state 20 per cent. The comparatively small proportion borne by the canton is probably due to the fact that most of the forest areas in the canton of Graubunden are communal forests, very little being owned by the canton.

Engadine.—On Tuesday, July 22nd, a journey was made to St. Moritz and Pontresina. In this region the Swiss stone pine (*Pinus Cembra*, L.) and the common larch take the place of spruce, silver fir and other trees growing on the land drained by the Rhine and Rhone. Spruce is still seen but it is very small and does not grow sufficiently rapidly to make it a commercial success. Between the elevations of 6000 and 7000 feet larch and *P. Cembra* attain a considerable size and several successive larches girthed 10 feet, 8 feet, 9 feet 5 inches, and 5 feet 8 inches respectively at breast high. These trees were between 250 and 300 years old. In this region one tree was cut which showed 800 annual rings. Above 7,000 feet the trees rapidly deteriorate, soon becoming mere bushes. A peculiarity of the trees in this region is their thick rugged bark, a great difference being noticeable between these trees and the ones noted in other districts. A considerable amount of protection work, wall-building, &c., is being carried on, and *Pinus Cembra* is being planted together with *Picea pungens*, Engelm., up to a height of 8000 feet.

Both are thriving, but they experienced a check last winter on account of late growth and improper ripening of the wood. The timber of *Pinus Cembra* when cut from trees grown for ornamental purposes in this country is very knotty, and the same condition appears to obtain in naturally-grown timber. The older woods, however, appear to be rather on the thin side and timber from areas more recently planted may be cleaner.

By reason of Pontresina becoming a popular tourist resort it has increased rapidly in size of late years, and to protect it from avalanches, protection operations, which are claimed to be the largest in Europe, are being carried on. The mountain sides are

being protected by walls up to a height of 10,000 feet. These walls are $4\frac{1}{2}$ feet wide on the top and more below and cost about $6\frac{1}{2}$ francs a cubic metre. Already about 320,000 francs have been spent and 100,000 Cembran pines have been planted.

In addition to the forest areas above mentioned, protective works at Thuis were examined, and a visit was paid to one of the town forests of Lucerne. The botanical gardens and town gardens of Zurich and Berne were visited, also the experimental forest garden at Adlisberg and a paper factory at Landquart.

The forest garden at Adlisberg is under the direction of Prof. Engler, and he is conducting numerous experiments with seeds of Scots pine and spruce. Seeds have been collected from many widely separated areas and from trees growing under widely different conditions. The plants are now about 8 years old and show a remarkable difference in development. A similar experiment with seed from the same regions is being conducted in Scotland. Other trees under observation are oak, sycamore and larch.

A very interesting group of abnormal spruce was pointed out by Prof. Engler. These plants are now 13 years old and all originated from seed from one mother tree. This tree had a normal leader with a curious bunchy branch system. The seedlings are of three distinct types. About 16 per cent. are of normal habit with single trunks, 31 per cent. have developed several trunks from the base, whilst 53 per cent. form dense, round, cushion-like plants. There are minor variations which make it possible to select forms which could be substituted for almost all of the named garden varieties.

The Botanic Garden of Zurich, over which we were conducted by Prof. Schinz, is arranged solely for teaching purposes and plants exhibiting different peculiarities of growth, leafage, flowering, &c., are arranged in distinct groups. The Garden, however, appears to be much too small for what is required of it and a considerable amount of overcrowding is apparent.

The Zurich town gardens are interesting and contain a number of fine trees, notably *Acer dasycarpum*, *Paulownia imperialis*, *Catalpa bignonioides*, *Cedrela sinensis* and *Tilia argentea*.

In conclusion I have to express my gratitude to the various conductors, who were unsparing in their attentions and always ready to respond when explanations were required.

XLVI.—MISCELLANEOUS NOTES.

MR. J. W. MATTHEWS.—We learn that Mr. J. W. Matthews, who, on leaving Kew in 1895, was appointed to the post of Assistant in the Municipal Gardens, Cape Town, S. Africa, has been appointed Curator of the newly founded National Botanic Garden of S. Africa which is being established at Kirstenbosch.

Economic Notes, Hull.—To those interested in the commerce of this country a visit to any large shipping port offers much of interest.

While attending the Museums Association Meeting recently held in Hull, the writer took advantage of the opportunity and visited some of the docks. Though during part of the time a labour strike was in progress many interesting products of recent importation were noted, including those mentioned below.

FRUITS AND VEGETABLES.—These products are landed direct from the steamers to the river-side quays and during my first visit 12,000 packages of fruit together with general cargo arrived in one steamer from Hamburg, while another from Rotterdam brought 15,000 packages of fruit and general cargo.

Both the fruit and vegetables are sold by rapid auction on the spot and speedily cleared for distribution to all parts of the country. Considerable quantities of "Best Hand-picked Pomeranian Bilberries" packed in chip baskets containing from eight to ten lbs. of the fruit were noted from Hamburg; also half cases of Sicilian lemons; red currants in chip baskets; and sieves of cherries and black currants covered with perforated paper kept in position by stakes of split hazel saplings.

The imports from Rotterdam included red and black currants, bilberries, cherries, cauliflowers, potatoes, tomatoes, gherkins and some drum-shaped packages containing onions. These packages are apparently formed of closely fitting hoops of split *Arundo* stems with wicker-work ends, sufficiently open to allow of the contents being readily observed.

Another steamer, from Boulogne, brought cucumbers in crates, greengages and apricots in chip boxes and drums, also red cabbage and potatoes in sacks.

OIL SEEDS.—Hull being an important centre of the seed crushing industry it was not surprising to find several varieties of oil-seeds in considerable quantities. It may be here observed that Linseed, Soya bean, Cotton and Castor seed are imported in large quantities for local treatment. I was fortunate in obtaining permission to board the "Gafsa" which was discharging into lighters her cargo which consisted solely of 6,800 tons of Linseed shipped from New York, the seed being loosely placed in the hold. Linseed was also observed from Calcutta and Montreal, Castor seed from Bombay and Calcutta, Rape seed from Karachi and Buenos Aires, Cotton seed from Bombay, Smyrna, Hamburg and Dunkirk, but no Soya beans.

TIMBERS.—In the timber docks enormous quantities of deals and boards, slating battens, railway sleepers, pit props, boxboards and "firewood" were observed from northern ports. The last mentioned product consisted of odds and ends of sawn timber from five feet lengths down to a few inches.

Other timbers noted were oak cask staves from Libau, birch squares and veneers from Abo and birch squares from Helsingfors, oak scantlings and butts from Odessa, boat-hooks and planed boards from Christiania, bundles of broom handles from Archangel and quantities of "rickers" or short poles from several ports.

FOOD GRAINS.—Wheat was observed from Karachi, Montreal and Sydney, and Maize from the River Plate.

Other products recognised were Myrobalans (the fruits of *Terminalia Chebula*) from Bombay, and Locust beans (the pods of *Ceratonia Siliqua*) from Cyprus.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin :—

The Right Honourable the Earl of Moray, Doune, Perthshire.—Section of Bog Oak and trunk specimens of *Abies cephalonica*, *A. Nordmanniana*, *Picea sitchensis*, *Araucaria imbricata* and *Tsuga Albertiana*.

Capt. W. A. Kerr, V.C., Folkestone.—Samples of paper made from *Bambusa polymorpha*.

Director of Agriculture, Northern Nigeria.—Seeds of *Vouandzeia subterranea* and *Kerstingiella geocarpa*.

The British Dyewood Co., Ltd., Glasgow.—Samples of dyeing and tanning extracts.

Messrs. W. Tyzack, Sons & Turner, Ltd., Sheffield.—Eight examples of saws used in forestry, &c.

Mr. T. Inamura, Koshun, Formosa.—Acorns of species of *Quercus* and seeds of several Coniferous trees.

Baron de Worms, Milton Park, Egham.—Section of trunk of *Pseudotsuga Douglasii*.

Messrs. Barron, Elvaston Nurseries, Borrowash.—Model of a tree lifting machine.

Messrs. Boving & Co., Ltd., London, E.C.—Model of a Sampson Stump Extractor.

Major P. J. Waldron, Pitlochry, Scotland.—Specimen of *Gymnosporangium clavariaeforme* on *Juniperus communis*.

Director, Botanic Gardens, Sydney, New South Wales.—Pods of *Serianthes calycina*.

Messrs. F. W. Heilgers & Co., London, E.C.—Specimens of half-stuff and paper made from Bamboo.

Mr. G. Craig Sellar, Norvern, Argyllshire.—Sections of timber of *Tilia petiolaris*, *Acer platanoides*, *Prunus Avium*, *Thuja plicata* and *Taxus baccata*.

Mr. R. N. Rogers, Carwinion, Falmouth.—Log of *Thuja plicata* and specimen of wood stained with the mycelium of *Chlorosplenium aeruginosum*.

Curator, Botanic Station, Dominica.—Samples of Lime juice, essential oil of Limes, otto of Limes and citrate of Lime.

J. M. H.

Hooker's Icones Plantarum.—The 30th volume of this work (or part iv of volume x of the fourth series) has recently been published. It contains an unusual number of species belonging to genera which have not been figured so far, among them eleven that are monotypic, namely *Asterophorum* (Tiliaceae), *Pittosporopsis* (Icacinaeae), *Murtonia* (Leguminosae-Hedysareae), *Micholitzia* and *Microstephanus* (Asclepiadaceae), *Warpurea* (Acanthaceae), *Stemmatodaphne* (Lauraceae), *Klaineanthus*, *Necepsia*, *Discoglypsemna* (these three Euphorbiaceae) and *Rolfea* (Orchidaceae). Other genera figured in the volume for the first time are *Ostryoderris* (Leguminosae-Dalbergieae), *Edithecolea* (Asclepiadaceae), *Satanocrater* (Acanthaceae) and *Spondianthus* (Euphorbiaceae). Of special morphological

interest are *Hibiscus Watsoni* from Upper Burma, a species with large spikes of yellow flowers, buried in a mass of long linear bracts, a yellow *Gentiana* (*G. stylophora*) with corollas 5-6 cm. long and 6-7 cm. wide, from Sikkim and Yunnan, an almost completely isolated type, and *Chilocarpus anguineus* from Sarawak, remarkable on account of its long, vermiform fruits, whilst *Pogostemon Rogersii* attracts our attention owing to its being the first species of the genus recorded from Africa and *Pardenia sokotensis* as a curious link between the flora of Nigeria and Madagascar, no close ally being known so far from the African continent. Economically important are *Boswellia odorata*, a resin tree from Northern Nigeria, only known in the cultivated state, *Parthenium argentatum*, the Mexican rubber plant known as 'Guayule,' and *Styrax benzoides*, the source of the commercial Siam Benzoin or, perhaps better, one of the products known commercially as Siam Benzoin.

O. S.

Botanical Magazine for August.—The plants figured are *Stanhopea convoluta*, Rolfe (t. 8507); *Centaurea crassifolia*, Bertol. (t. 8508); *Cytisus supranubius*, O. Kuntze (t. 8509); *Grevillea bipinnatifida*, R. Br. (t. 8510); and *Solenostemon Godefroyae*, N. E. Brown (t. 8511).

The *Stanhopea* is most nearly allied to *S. tricornis*, Lindl., but it has larger flowers and differs in the structure of the lip. It was introduced into cultivation from the province of Antioquia, Colombia, a few years ago by Mr. F. Claes of Etterbeek, Brussels, and first flowered in his establishment in September, 1909. The plant in the Kew collection which provided the material for the figure was presented by Messrs. Charlesworth & Co., of Haywards Heath.

Centaurea crassifolia is endemic in Malta whence it was introduced into the Cambridge Botanic Garden in 1894 by Professor G. Henslow. The plant then received was lost, and was at a later date replaced by one from the garden of the late Sir Thomas Hanbury of La Mortola. From this plant material for the figure was sent to Kew by Mr. Lynch at the request of Professor Henslow. At Cambridge the species has been found to grow well in the Succulent House, under conditions suitable for Sempervivums and similar plants. It is an undershrub with long spatulate fleshy leaves and purple-rose flower-heads nearly two inches across, and is remarkable in the genus in having no appendages to the involucre bracts.

Cytisus supranubius is a very floriferous species with creamy white flowers bearing a broad pink stripe on the standard. It is a native of the Canary Islands and is said to be the most characteristic plant of the alpine region of Teneriffe, where it grows abundantly at altitudes of from 6000 to 9000 ft. The material for the figure was sent to Kew by Sir F. Moore of the Royal Botanic Garden, Glasnevin, where the plant is grown against a wall.

The *Grevillea* is a West Australian species with ornamental foliage and graceful racemes of red flowers. The Kew plant from which the specimen figured was obtained is a leafy shrub about three feet high, and was raised from seed received from the Adelaide Botanic Garden in 1909.

Solenostemon Godefroyae is a new species from the Congo and Angola, and is the same plant as that included in the late Mr. Godefroy-Lebeuf's Catalogue for 1903 under the name of *Coleus Godefroyae*. Material of the same species, collected in Angola in 1873 by Mr. and Mrs. Monteiro, had been referred to *Solenostemon ocymoides*, Schum. & Thonn. A flowering plant was sent to Kew in November, 1903, by Messrs. Sander & Sons of St. Albans, and another plant, which supplied the material for the plate, was received in 1911 from the Jardin Colonial, Laeken, near Brussels. The genus *Solenostemon* is very closely allied to *Coleus* and *Plectranthus*, but may be distinguished by the subequally 2-lipped calyx.

Botanical Magazine for September.—The plants figured are *Agathis vitiensis*, Benth. & Hook. f. (t. 8512); *Rosa foliolosa*, Nutt. (t. 8513); *Catsetum microglossum*, Rolfe (t. 8514); *Iris mellita*, Janka (t. 8515); and *Utricularia longifolia*, Gardn. (t. 8516).

Agathis vitiensis is a Dammar indigenous in the Fiji Archipelago, where it is known as the Dakua. The wood serves much the same uses as deal and is employed by the Fijians for house-floors and for masts, booms and spars. The resin which the trees exude has not been, so far, made an article of commerce but in the interior of the larger islands has been used for burning. The material for the figure was obtained from a plant raised at Kew from seeds presented by Sir J. B. Thurston, then Governor of Fiji, in 1881. This plant is now a tree twenty-five feet in height, and is under cultivation in the Mexican House.

Rosa foliolosa is the South-western Prairie Rose of North America which as a wild species is apparently restricted to the prairie region of Arkansas, northern and central Texas and the Indian territory. It is well characterised by its dwarf habit, its running rootstocks and its fragrant carmine blossoms. It was first discovered by Nuttall in Arkansas about 1820 and later was met with in Texas by Berlandier, Drummond and others. It is rather a rare species in collections of roses. The material for the plate came from the garden of the Rev. Canon Ellacombe, Bitton.

Catsetum microglossum is an interesting species met with for the first time in 1911 in Peru by Mr. W. Fox who found it growing on a dead stump near an Indian house on the River Igaraparana, a tributary of the River Putumayo. This plant was presented by Mr. Fox to Kew where it flowered for the first time in a tropical house in March, 1913, and enabled the figure to be prepared.

The *Iris* figured at t. 8515 was presented to the Kew collection by the Hon. Mr. N. C. Rothschild who had obtained it from Mersina in Cilicia. In identifying it with *I. mellita*, Janka, a native of Thrace, so comprehensive a view of Janka's species is taken as necessitates also the reduction thereto of *I. rubro-marginata*, Baker from Asia Minor and *I. Straussii*, Leichtl., from Western Persia. The original *I. mellita* was first collected by Janka in 1871 on dry slopes in Tschindem Tepe near Philippople in Bulgaria and it has since been met with frequently throughout Southern Bulgaria. The original *I. rubro-marginata* was described from specimens

collected near Scutari by Mr. W. Barbey and it has since been sent from Smyrna. The original *I. Straussii* was originally sent by Mr. Strauss to Mr. Leichtlin from Sultanabad.

Utricularia longifolia is a Bladderwort which was first met with on Mount Pedra Bonita near Tejuco in the province of Minas Geraes, Brazil in 1840 by Professor Gardner. It has long been in cultivation in European collections on account of its showy and rather striking blossoms, but it has also attracted the special attention of morphologists and of practical horticulturists by reason of the extraordinary plasticity of the leaves which may grow out into bladder bearing stolons or may produce from their tips tufts of leaves and stolons and rhizoids. This phenomenon, which is not infrequent in the genus, is in *U. longifolia* unusually striking on account of the size of the leaves. The material for the figure was obtained from the Cambridge Botanic Garden.

Flora of Tropical Africa.—The issue of the concluding part of the first section of Vol. vi of this work, edited by Sir W. T. Thiselton-Dyer, has now to be recorded. The section includes 1,094 pages and has appeared in six parts, the dates of publication of which have been as follows :—

Part I.	pp. 1-192	published	March, 1909.
„ II.	„ 193-384	„	December, 1910.
„ III.	„ 385-576	„	October, 1911.
„ IV.	„ 577-768	„	March, 1912.
„ V.	„ 769-960	„	October, 1912.
„ VI.	„ 961 to end	„	April, 1913.

The orders dealt with are Nyctagineae-Euphorbiaceae inclusive.

The Editor's Preface, in which the history of the production of this important volume has been given in detail, is reproduced below. It is a matter of deep regret that with the completion of the publication of this section Sir W. T. Thiselton-Dyer's editorship of the Flora of Tropical Africa ceases.

“This is the last section of the ‘Flora of Tropical Africa’ which will be issued under my editorship. The control and supervision necessary in an undertaking of the kind cannot be properly exercised except at the headquarters of its preparation. Some degree of uniformity must at least be aimed at in the work of different contributors. Questions will consequently arise on which the editor must give a decision : difficulties which are readily solved by personal discussion are not disposed of so easily by correspondence.

“The preparation of this section has been protracted. When I retired from the Directorship of Kew in 1905 much of the material available had been worked up by my indefatigable contributor, Mr. J. G. Baker, F.R.S. The continuous access of fresh collections had in the meantime largely added to it. In fact the general position with regard to the Flora resembles the ‘Curve of Pursuit,’ in which the pursuer has to change his direction constantly in the attempt to overtake his elusive quarry. In the case of the smaller

orders Mr. Baker's advanced years made it necessary to entrust the necessary additions to other hands. The *Euphorbaceae* were not so easily disposed of. This vast family will probably prove to supply the dominant constituent of tropical forests. In view of the large access of fresh material and of what had been worked out by Continental botanists it was necessary to recast entirely what had been prepared. This task was generously undertaken by my successor, Lt.-Col. Sir David Prain, F.R.S., and though my name stands on the title-page of the volume, its accomplishment and the merit which attaches to it must for the most part be attributed to his indefatigable energy and critical insight. Mr. J. Hutchinson collaborated with him, and Mr. N. E. Brown, A.L.S., who finds a peculiar fascination in the study of succulent plants, the difficulties of which most botanists find deterrent, undertook the genus *Euphorbia*.

"The present section thus disposes of all that was in view when I retired from Kew. The 'Flora of Tropical Africa' differs from other works in the series of which it is a part in having an official and not a personal character. In the preface in the seventh volume I have given an account of the circumstances of its initiation and of those under which, at the instance of the Government, its preparation was resumed.

"In view of what I have said, I can have no doubt that I am adopting the course which is most expedient in the interest of the work in resigning the task of its completion to the present Director of Kew.

"It has been the practice in the more recent works that have been prepared at Kew to conform to the classification and sequence of orders adopted in Bentham and Hooker's 'Genera Plantarum.' This was accordingly done by Professor Oliver, F.R.S., in the first and second volumes. In the third he appears to have preferred the continuous numbering of the cohorts given by Sir Joseph Hooker in his translation of 'A General System of Botany' by Le Maout and Decaisne. Bentham and Hooker, however, in the 'Genera Plantarum' commence a new numbering of the cohorts for *Gamopetalae*. This I have followed in Vol. IV. The numerical sequence does not therefore follow on from that of Professor Oliver, but as the actual sequence adopted by him is that of the 'Genera Plantarum' anyone who cares to do so can readily correct Professor Oliver's numbers. Unfortunately, in Vol. V., a further correction is necessary. By one of those clerical oversights which can only be accounted for by the frailty of human nature, the numbering of the cohorts does not conform to either work. *PERSONALES* should be ix. instead of xxiv. and *LAMIALES* x. instead of xxv.

"Although the Old World has always had before it the problem of unknown Africa, it is singular how tardy has been its exploration compared with that of the New. Yet it has been through no lack of curiosity. In the fourth century B.C., and possibly earlier, the Greeks had a proverb preserved by Aristotle, αἰὲν φέρεται τὴν Λιβύην καιρόν. At the commencement of our era Pliny, if with a whimsical explanation, recalls the 'vulgare Græciæ dictum semper aliquid novi Africam adferre.' In our twentieth century the novelty descends on the bewildered botanist in a continuous flood, and more than one generation will come and go without seeing it exhausted.

"A quarter of a century separates the three volumes of the 'Flora of Tropical Africa' issued by Professor Oliver from the fourth edited by myself. Nothing more was claimed for the former than that they were a 'repertory' of what was known of the vegetation of the time, imperfect as that knowledge was. Dr. Stapf in a memorandum in the 'Kew Bulletin' for 1906 (pp. 239, 240) has brought out in a striking way the immense progress it has made in the interval, 'For every three species then known, five species have since been added.' There is therefore already room for a supplement to the first three volumes of more than equal bulk. It would not be becoming for me to lay the burden on Kew. But it may be hoped that if, as may be confidently expected, it is able to complete the 'Flora of Tropical Africa' on the lines already laid down, substantial encouragement will not be wanting from H.M. Government to enable the Kew staff to add further to our knowledge of the vegetable resources of a portion of the earth's surface in which as a nation we have so large a stake.

"For the amended definition of the regions into which the area of the Flora is divided, reference may be made to the preface to the seventh volume.

"The further collections made use of in the present volume and not previously acknowledged are as follows:—

"I. UPPER GUINEA.—Aug. Chevalier, French Guinea; C. E. Lane-Poole and C. W. Smythe, Sierra Leone; Aug. Chevalier, Ivory Coast; J. Anderson, R. W. Brent, T. F. Chipp, A. E. Evans, A. C. Miles, and H. N. Thompson, Gold Coast; R. E. Dennett, H. Dodd, G. C. Dudgeon, J. H. J. Farquhar, Dr. Lamborn, J. C. Leslie, T. D. Maitland, Mr. and Mrs. P. A. Talbot, N. W. Thomas, A. H. Unwin, and J. L. Williams, Southern Nigeria; Dr. J. M. Dalziel, Col. E. J. Lugard, Dr. A. C. Parsons, B. E. B. Shaw, and C. C. Yates, Northern Nigeria.

"II. NORTH CENTRAL.—Aug. Chevalier, Chari Region, Darbanda, French Congo, &c.

"III. NILE LAND.—Dr. R. E. Drake-Brockman and R. J. Stordy, Southern Abyssinia; A. F. Broun, Sudan; M. S. Evans, R. Fyffe, and C. B. Ussher, Uganda; E. Battiscombe, M. S. Evans, E. E. Galpin, D. E. Hutchins, H. Powell, and W. S. Routledge, British East Africa.

"IV. LOWER GUINEA.—J. Gossweiler and Dr. F. G. Wellman, Angola; E. E. Galpin, German South-West Africa.

"V. SOUTH CENTRAL.—Rev. F. A. Rogers and F. Thonner, Belgian Congo.

"VI. MOZAMBIQUE DISTR.—J. T. Last, Zanzibar; M. T. Dawe, W. H. Johnson, and J. Stocks, Portuguese East Africa; J. M. Purves, Nyasaland; Mrs. O. Colville, E. E. Galpin, Miss L. S. Gibbs, Rev. Dr. F. C. Kolbe, H. G. Mundy, and Rev. F. A. Rogers, Rhodesia.

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Dr. E. De Wildeman, and Dr. A. Zahlbruckner, for the generous loan of type specimens and other material from the herbaria under their charge.

"I must add my final acknowledgments of the aid given me by Assistants in the Herbarium of the Royal Botanic Gardens; to Mr. C. H. Wright, A.L.S., in preparing the manuscript for the press and in checking the proofs; and to Mr. N. E. Brown, A.L.S., for working out the geographical distribution.

"For the detailed topography the third edition of the 'Spezial-Karte von Africa' (Gotha: Justus Perthes, 1893) has been chiefly used."

W. T. T.-D.

Witcombe; February 17, 1913.

Entebbe Botanic Garden.—The report of the work of the Botanical, Forestry and Scientific Department of the Uganda Protectorate for the year ending 31st March, 1912,* is published in a thin foolscap folio volume containing 26 pages and 17 pages of Appendices.

The section devoted to the botanical department is illustrated by several excellent reproductions of photographs of indigenous trees, economic plants and views of the garden. Among these are shown a fine example of *Antiaris toxicaria* (misspelled *Antiaria*), a tall handsome tree with a long clean trunk and spreading crown, a beautiful group of *Raphia monbuttorum*, the fernery, a prolific coffee-plant, and a group of Para rubber trees with an undergrowth of *Mucuna gigantea*, a leguminous climber which has proved to be the most suitable plant for ground-shade and green manure.

The forestry section contains pictures of a felling area, a saw-mill and *Funtumia* trees, all in the Mabira forest. Owing to the department having been understaffed during the period under review, little work has been done, but the chief future policy will be the encouragement of the exploitation of native timber, which has been found to resist the ravages of rot and attacks of white ants much better than the imported material now used.

The scientific section is now provided with a suitable museum in which are housed specimens of native craftsmanship and collections of specimens illustrating the industries and natural resources of the country. The results of the examination of various samples of rubber obtained in the Protectorate and shown at the International Rubber Exhibition in London are given in detail.

The report concludes with meteorological notes and tables of observations taken at various stations in the Protectorate.

J. H.

* Uganda Protectorate. Annual Report of the Botanical, Forestry and Scientific Department for the year ended 31st March, 1912. Government Printer, Entebbe, Uganda, 1912.